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# Manhattan Garment Center Urban Goods Movement Study. Phase I. Appendix Volume III

New York City Transportation Administration

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Urban Mass Transportation Administration
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# Manhattan Garment Center Urban Goods Movement Study

## APPENDIX VOLUME III

**NEW YORK CITY
TRANSPORTATION
ADMINISTRATION**

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16. Abstract

The Manhattan Garment Center Urban Goods Movement (UGM) Study represents the first major effort to investigate the goods movement problems existing in a major, highly urbanized environment. This apparel industry is located in a light manufacturing area situated in the heart of Manhattan. It is the largest manufacturing industry in the City as well as in New York State. The project is a comprehensive study of UGM and is organized to meet several objectives: 1) to be accessible and responsive to the community; 2) to develop design, evaluate, and implement short-term, low capital improvements for the UGM system; and 3) to identify long-term solutions to goods movement difficulties.

This report is Appendix Volume III of the Phase I Final Report of the Manhattan Garment Center UGM Study. The environmental effort of this study includes an analysis of the public costs of goods movement in terms of air and noise pollution and accidents. The public costs of goods movement also include an analysis of carbon monoxide emissions; estimation of the health costs of air pollution; ambient noise conditions; and the relationship of vehicular activity and congestion to accident costs in the New York City Garment Center. This report also presents some of the tools developed during the course of this study for the collection of data. Several aspects of the methodology used for the analysis of these data are also described. This report contains a bibliography that includes previous Garment Center studies as well as a list of readings.

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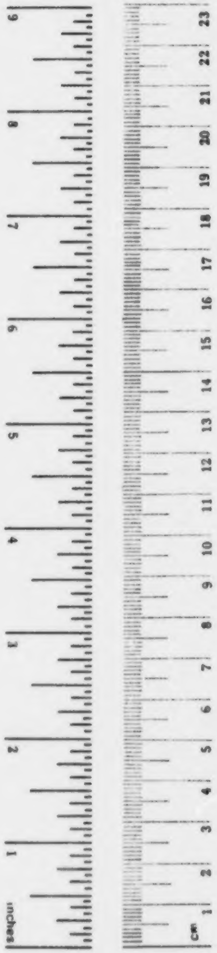
# METRIC CONVERSION FACTORS

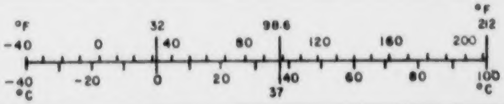
## Approximate Conversions to Metric Measures

| Symbol | When You Know | Multiply by | To Find | Symbol |
|---|---|---|---|---|
| | | **LENGTH** | | |
| in | inches | *2.5 | centimeters | cm |
| ft | feet | 30 | centimeters | cm |
| yd | yards | 0.9 | meters | m |
| mi | miles | 1.6 | kilometers | km |
| | | **AREA** | | |
| in$^2$ | square inches | 6.5 | square centimeters | cm$^2$ |
| ft$^2$ | square feet | 0.09 | square meters | m$^2$ |
| yd$^2$ | square yards | 0.8 | square meters | m$^2$ |
| mi$^2$ | square miles | 2.6 | square kilometers | km$^2$ |
| | acres | 0.4 | hectares | ha |
| | | **MASS (weight)** | | |
| oz | ounces | 28 | grams | g |
| lb | pounds | 0.45 | kilograms | kg |
| | short tons (2000 lb) | 0.9 | tonnes | t |
| | | **VOLUME** | | |
| tsp | teaspoons | 5 | milliliters | ml |
| Tbsp | tablespoons | 15 | milliliters | ml |
| fl oz | fluid ounces | 30 | milliliters | ml |
| c | cups | 0.24 | liters | l |
| pt | pints | 0.47 | liters | l |
| qt | quarts | 0.95 | liters | l |
| gal | gallons | 3.8 | liters | l |
| ft$^3$ | cubic feet | 0.03 | cubic meters | m$^3$ |
| yd$^3$ | cubic yards | 0.76 | cubic meters | m$^3$ |
| | | **TEMPERATURE (exact)** | | |
| °F | Fahrenheit temperature | 5/9 (after subtracting 32) | Celsius temperature | °C |



## Approximate Conversions from Metric Measures

| Symbol | When You Know | Multiply by | To Find | Symbol |
|---|---|---|---|---|
| | | **LENGTH** | | |
| mm | millimeters | 0.04 | inches | in |
| cm | centimeters | 0.4 | inches | in |
| m | meters | 3.3 | feet | ft |
| m | meters | 1.1 | yards | yd |
| km | kilometers | 0.6 | miles | mi |
| | | **AREA** | | |
| cm$^2$ | square centimeters | 0.16 | square inches | in$^2$ |
| m$^2$ | square meters | 1.2 | square yards | yd$^2$ |
| km$^2$ | square kilometers | 0.4 | square miles | mi$^2$ |
| ha | hectares (10,000 m$^2$) | 2.5 | acres | |
| | | **MASS (weight)** | | |
| g | grams | 0.035 | ounces | oz |
| kg | kilograms | 2.2 | pounds | lb |
| t | tonnes (1000 kg) | 1.1 | short tons | |
| | | **VOLUME** | | |
| ml | milliliters | 0.03 | fluid ounces | fl oz |
| l | liters | 2.1 | pints | pt |
| l | liters | 1.06 | quarts | qt |
| l | liters | 0.26 | gallons | gal |
| m$^3$ | cubic meters | 35 | cubic feet | ft$^3$ |
| m$^3$ | cubic meters | 1.3 | cubic yards | yd$^3$ |
| | | **TEMPERATURE (exact)** | | |
| °C | Celsius temperature | 9/5 (then add 32) | Fahrenheit temperature | °F |



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*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.

# MANHATTAN GARMENT CENTER
# URBAN GOODS MOVEMENT STUDY - PHASE I
## APPENDIX - VOLUME III

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JUNE, 1976
DOT-TRI-STATE CONTRACT
(DOT-OS-30053)

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# FOREWARD

The following is Appendix - Volume III to the Phase I Final Report of the Manhattan Garment Center Urban Goods Movement Study. Phase I consists of the development of a data base, analysis of the goods movement problem, and implementation of short-range proposals to improve the movement of goods and people. This study was funded by the City of New York, the United States Department of Transportation, the Office of the Assistant Secretary for Policy,Plans and International Affairs, and the Office of the Assistant Secretary for Systems Development and Technology, and the United States Environmental Protection Agency. The DOT-Tri-State contract (DOT-OS-30053) was signed in October of 1972 and announced by Secretary Volpe during a visit to the Garment Center. The agreement between TAD-Tri-State was signed in May of 1973. The project wishes to acknowledge the continuing support and the assistance provided by the numerous agencies and individuals involved. In particular the help of Dr. Charles Hedges of the United States Department of Transportation and Robert T. Wood of the Tri-State Regional Planning Commission has been invaluable.

The role of urban goods movement in the transportation planning process has not yet been clearly established. There are two divergent schools of thought on this issue. The first would attempt to reduce the economic, environmental, and social costs of the present urban goods movement system. The second school recognizes these costs but states they are the responsibility of private enterprise and beyond the realm of influence of government. One objective of this Study has been to show that it is feasible to improve the goods transportation system by the use of existing tools available to government agencies in a cooperative effort with private enterprise.

Work on Phase II of the Manhattan Garment Center Urban Goods Movement Study began in September 1975. Phase II will consist of a continuation of certain elements of the Phase I program and will initiate several additional areas of investigation, such as consolidation and parking reservation systems.

This Appendix - Volume III provides a detailed description of the activities and analyses conducted during the Manhattan Garment Center Urban Goods Movement Study - Phase I. Additional detailed information is provided in Appendix - Volume I and Appendix - Volume II. A summary of the Phase I effort appears in a report titled, Manhattan Garment Center Urban Goods Movement Study - Phase I.

# VII PUBLIC COSTS OF GOODS MOVEMENT

## VII.1 INTRODUCTION

The congestion and conflicts within the Garment Center have pecuniary and nonpecuniary repercussions. Certain costs attributable to congestion, such as extra long delivery times, are passed on to the customers through higher charges. Other costs due to factors as poorer air quality are borne by those working in and frequenting the District, but are usually not reflected in prices charged to the purchaser. The analysis of these external public costs will constitute the environmental effort of the study. The major categories of hidden public costs include air and noise pollution and accidents.

The study's primary aims regarding the environmental aspects of the Garment Center were two-fold: the development of the emissions factors for vehicles in the area; and an evaluation of the cost of pollution, one of the public costs of the goods movement system. The major data collection and evaluation effort was conducted by the Department of Air Resources, the Bureaus of Noise Abatement and Motor Vehicle Pollution Control, and Charles River Associates.

To meet national Ambient Air Quality Standards, 1973 carbon monoxide emission levels (estimated at 1,399 lbs. per day) have to be reduced by 73 percent by December 31, 1976. Vehicle turnover, the replacement of older more polluting vehicles by newer and less polluting ones, taxi and truck retrofit, and vehicle inspection strategies will reduce emissions by 53 percent. Thus, additional transportation control strategies will have to be implemented in the Garment Center in order to meet the CO air quality standards. This study has estimated the 1973 health costs of air pollution in the Garment Center to have been $177 per capita. Between 96,000 and 116,000 persons appear to be exposed to CO emissions in the area, therefore, the total cost of air pollution lies in the range of $17 million to $20.5 million.

Ambient noise levels in the district are also high. $L_{50}$ readings averaged 69 dBA on the streets and 73 dBA on the avenues. There appeared to be no marked difference in noise levels between the core of the Garment Center and the areas surrounding it. In addition, changes in traffic volumes do not appear to alter noise levels significantly.

An anlysis of accident data in the Garment Center suggests that a major portion of the cost of accidents is attributable to automobile and taxi traffic. As a result, a reduction in truck traffic would not be expected to significantly reduce accident costs in the area.

## VII.2 ANALYSIS OF CARBON MONOXIDE EMISSIONS

As a result of the monitoring effort, air quality measurements were taken at thirteen sites located throughout the District. The data for carbon monoxide is presented in Table VII-1. Included in the Table are: monitoring site, date, number of samples per day, time of peak hourly concentration, and daily peak values of the 1-hour and 8-hour concentrations. The data presented should be compared with the Federal Air Quality Standards which require, for carbon monoxide, that a 1-hour average of 35 ppm (parts per million) and 8-hour averages of 9 ppm not be exceeded more than once per year. From this data, it is noted that 1-hour averages of 38 ppm, 38 ppm, and 42 ppm were experienced at 7th Avenue, 39th Street, and 8th Avenue, respectively. Although these levels exceed 35 ppm, they occurred only once at the specified sites, and therefore do not constitute violations of federal standards. However, since each site was monitored for a very short time period, approximately one week, there is a strong likelihood that violations of standards would occur over a one year period. Further examination shows that the 8-hour standard is a much more critical problem . Levels were greater than 9 ppm on 60 of the 72 days during which 8-hour concentrations were determined. On 20 of these 60 days the standard was exceeded by 100% or more. Further it is noted that violations of this standard occurred at all sites except those

## Table VII-1 : CARBON MONOXIDE DATA

| MOBILE LAB SITE | DATE | NO. OF SAMPLES | PEAK HOUR(S) | DAILY PEAK MEASUREMENTS | |
|---|---|---|---|---|---|
| | | | | 1-HOUR AVG. (PPM) | 8-HOUR AVG. (PPM) |
| 7th Ave. between 37th & 38th Streets | 3-29-73 | 7 | 3-4PM | 35 | - |
| | 4- 2-73 | 7 | 3-4PM | 30 | - |
| | 4- 3-73 | 7 | 3-4PM | 30 | - |
| | 4- 4-73 | 7 | 2-4PM | 26 | - |
| | 4- 5-73 | 7 | 2-3PM | 16 | - |
| | 4- 9-73 | 12 | 12-1PM | 23 | 16 |
| | 4-10-73 | 12 | 7-8PM | 15 | 11 |
| | 4-11-73 | 12 | 3-4PM | 15 | 11 |
| | 4-12-73 | 10 | 1-2PM | 17 | - |
| | 4-13-73 | 12 | 4-5PM | 15 | 11 |
| | 4-16-73 | 12 | 3-5PM | 38 | 28 |
| | 4-17-73 | 12 | 5-6PM | 20 | 15 |
| | 4-18-73 | 12 | 12-1PM | 25 | 22 |
| 6th Ave. between 36th & 37th Streets | 3-29-73 | 7 | 2-3PM | 11 | - |
| | 4- 2-73 | 7 | 12-1PM | 15 | - |
| | 4- 3-73 | 7 | 3-4PM | 17 | - |
| | 4- 5-73 | 5 | 3-4PM | 12 | - |
| | 4- 6-73 | 6 | 2-3PM | 10 | - |
| | 4- 9-73 | 12 | 1-2PM | 11 | 9 |
| | 4-10-73 | 12 | 3-4PM | 17 | 14 |
| | 4-11-73 | 8 | 2-3PM | 20 | 9 |
| | 4-12-73 | 10 | 8-9PM | 8 | 6 |
| | 4-13-73 | 12 | 5-6PM | 9 | 7 |
| | 4-16-73 | 6 | 8-9PM | 12 | - |
| 39th St. between 7th & 8th Avenues | 4-23-73 | 12 | 6-7PM | 20 | 14 |
| | 4-24-73 | 12 | 5-6PM | 28 | 17 |
| | 4-25-73 | 12 | 5-6PM | 27 | 17 |
| | 5-10-73 | 12 | 5-6PM | 38 | 22 |
| | 5-11-73 | 12 | 5-6PM | 28 | 25 |
| 8th Ave. between 36th & 37th Streets | 7- 3-73 | 12 | 10-11PM | 42 | 23 |
| | 7- 5-73 | 12 | 12- 1PM | 14 | 12 |
| | 7- 6-73 | 12 | 5- 6PM | 16 | 12 |
| | 7- 9-73 | 12 | 5- 6PM | 18 | 15 |
| | 7-10-73 | 12 | 5- 6PM | 22 | 18 |
| | 7-11-73 | 12 | 5- 6PM | 20 | 13 |
| | 7-12-73 | 6 | 10-11AM | 15 | - |
| 36th St. between 7th & 8th Avenues | 7-12-73 | 4 | 3- 4PM | 25 | - |
| | 7-13-73 | 12 | 9-10AM | 30 | 24 |
| | 7-16-73 | 12 | 6- 7PM | 30 | 19 |
| | 7-17-73 | 12 | 9-10AM | 22 | 18 |
| | 7-18-73 | 12 | 8- 9AM | 25 | 17 |
| | 7-19-73 | 12 | 8- 9AM | 25 | 18 |

Table VII-1 : CARBON MONOXIDE DATA (cont.)

| MOBILE LAB SITE | DATE | NO. OF SAMPLES | PEAK HOUR(S) | DAILY PEAK MEASUREMENTS 1-HOUR AVG. (PPM) | 8-HOUR AVG. (PPM) |
|---|---|---|---|---|---|
| 9th Ave. between 35th & 36th Streets | 7-20-73 | 10 | 10-11AM | 18 | 15 |
| | 7-23-73 | 11 | 2- 3PM | 20 | 10 |
| | 7-24-73 | 12 | 7- 8AM | 15 | 11 |
| | 7-25-73 | 12 | 4- 5PM | 30 | 16 |
| | 7-26-73 | 12 | 8- 9AM | 18 | 16 |
| | 7-27-73 | 12 | 3- 5PM | 28 | 20 |
| | 7-30-73 | 12 | 3- 4PM | 16 | 13 |
| 35th St. between 7th & 8th Avenues | 4-19-73 | 12 | 6- 7PM | 18 | 9 |
| | 4-20-73 | 12 | 12- 1PM | 9 | 6 |
| | 4-26-73 | 12 | 8-9AM/5-6PM | 11 | 9 |
| | 7-31-73 | 12 | 2- 3PM | 20 | 16 |
| | 8- 1-73 | 12 | 9-10AM | 20 | 13 |
| | 8- 2-73 | 12 | 6- 7PM | 18 | 16 |
| | 8- 3-73 | 12 | 12- 1PM | 29 | 17 |
| 36th St. between Dyer & 10th Avenues | 8- 8-73 | 12 | 7-8AM | 20 | 14 |
| | 8-24-73 | 12 | 5-6PM | 13 | 9 |
| | 8-27-73 | 12 | 7-8AM | 10 | 9 |
| | 8-28-73 | 12 | 5-6PM | 15 | 10 |
| | 8-29-73 | 12 | 8-9AM | 12 | 9 |
| | 8-30-73 | 12 | 5-6PM | 15 | 11 |
| 10th Ave. at 37th Street | 9-10-73 | 3 | 5-6PM | 14 | - |
| | 9-11-73 | 12 | 5-6PM | 15 | 10 |
| | 9-12-73 | 12 | 5-6PM | 10 | 8 |
| | 9-13-73 | 12 | 8-9AM | 10 | 6 |
| | 9-14-73 | 11 | 6-7PM | 15 | 10 |
| 36th St. between B'way & 10th Ave. | 12- 3-73 | 9 | 2-3PM | 25 | 16 |
| | 12- 4-73 | 12 | 6-7PM | 35 | 27 |
| | 12- 5-73 | 12 | 8-9AM | 24 | 18 |
| | 12- 6-73 | 12 | 5-6PM | 18 | 16 |
| | 12- 7-73 | 12 | 12-1PM | 20 | 16 |
| 38th St. between 7th & 8th Avenue | 1-16-74 | 12 | 5- 6PM | 26 | 18 |
| | 1-17-74 | 10 | 11-12PM | 11 | - |
| | 1-21-74 | 12 | 2- 3PM | 21 | 15 |
| | 1-22-74 | 12 | 9-10AM | 25 | 18 |
| | 1-23-74 | 12 | 5- 6PM | 25 | 18 |
| 37th St. between 7th & 8th Avenues | 1-24-74 | 12 | 9-10AM | 33 | 22 |
| | 1-25-74 | 12 | 12- 1PM | 22 | 18 |
| | 1-28-74 | 12 | 12- 1PM | 25 | 19 |
| | 1-29-74 | 12 | 12- 1PM | 17 | 14 |
| | 1-30-74 | 12 | 9-10AM | 29 | 18 |
| | 1-31-74 | 12 | 12- 1PM | 23 | 16 |

## Table VII-1 : CARBON MONOXIDE DATA (cont.)

| MOBILE LAB SITE | DATE | NO. OF SAMPLES | PEAK HOUR(S) | DAILY PEAK MEASUREMENTS 1-HOUR AVG. (PPM) | DAILY PEAK MEASUREMENTS 8-HOUR AVG. (PPM) |
|---|---|---|---|---|---|
| Broadway at 38th Street | 2- 4-74 | 12 | 3-4PM | 15 | 12 |
| | 2- 5-74 | 11 | 2-3PM | 14 | 12 |
| | 2- 6-74 | 12 | 3-4PM | 18 | 15 |
| | 2- 7-74 | 12 | 12-1PM | 18 | 15 |
| | 2- 8-74 | 12 | 3-4PM | 14 | 13 |
| The Following Data Were Not Taken As Part of The Garment Center Project. | | | | | |
| 8th Ave. between 41st & 42nd Streets | 10-15-73 | 15 | 5- 6PM | 15 | 13 |
| | 10-16-73 | 24 | 2- 4PM | 14 | 13 |
| | 10-17-73 | 24 | 1- 2PM | 16 | 14 |
| | 10-18-73 | 24 | 5- 6PM | 16 | 14 |
| | 10-19-73 | 24 | 10-11AM | 25 | 18 |
| | 10-20-73 | 24 | 11-12PM | 20 | 15 |
| | 10-21-73 | 24 | 10-11AM | 25 | 15 |
| | 10-22-73 | 24 | 7-8PM/9-10AM | 25 | 20 |
| | 10-23-73 | 24 | 8- 9PM | 40 | 25 |
| | 10-24-73 | 24 | 6- 7PM | 25 | 20 |
| | 10-25-73 | 24 | 5- 6PM | 22 | 16 |
| | 10-26-73 | 24 | 6- 7PM | 22 | 18 |
| | 10-27-73 | 24 | 2- 3PM | 13 | 11 |
| | 10-28-73 | 23 | 7- 8PM | 14 | 14 |
| | 10-29-73 | 24 | 6- 7PM | 17 | 15 |
| | 10-30-73 | 24 | 7- 8PM | 19 | 13 |
| | 10-31-73 | 24 | 6- 7PM | 25 | 18 |
| | 11- 1-73 | 24 | 6- 7AM | 18 | 11 |
| | 11- 2-73 | 24 | 10-11AM | 35 | 31 |
| | 11- 3-73 | 24 | 5- 6PM | 14 | 11 |
| | 11- 4-73 | 24 | 5- 7PM | 15 | 12 |
| | 11- 5-73 | 24 | 5- 6PM | 13 | 12 |
| | 11- 6-73 | 24 | 4- 5PM | 11 | 10 |
| | 11- 7-73 | 24 | 5- 6PM | 16 | 13 |
| | 11- 8-73 | 24 | 8-10PM | 21 | 16 |
| | 11- 9-73 | 24 | 4- 5PM | 15 | 12 |
| | 11-10-73 | 24 | 2- 4PM | 9 | 8 |
| | 11-11-73 | 24 | 3- 4PM | 14 | 10 |

along 6th Avenue. At the 6th Avenue site the 8-hour average exceeded 9 ppm on one of the 5 days for which levels were determined.

It is most likely that during a one year period the 8-hour standards would have been violated on 6th Avenue as well. Furthermore, the 6th Avenue site is located next to an open parking lot thus allowing for better ventilation and lower concentrations than might be expected on other less open sections of 6th Avenue. Finally, it is noted that the attached Table includes data from 8th Avenue and 41st Street. These data were obtained as part of another effort, however they were included as being representative of conditions in peripheral areas. Examination of these data shows that the 8-hour standard was violated on 27 out of 28 days, and that the 1-hour standard was exceeded once with a value of 40 ppm. It should be realized that the Port Authority Bus Terminal, which is a major source of pollution, is located on 8th Avenue between 40th and 41st Streets. Also note that, as on 6th Avenue, the mobile laboratory was parked next to a parking lot inthe block north of the bus terminal. From this basic environmental data, a new computerized emissions inventory has been set up by the Bureau of Motor Vehicle Pollution Control. The new program generates emissions of carbon monoxide, hydrocarbons, and nitric oxides for any or all motor vehicle modes, in any area, and for any year between 1970 and 1996, inclusive. These emissions projections can be on an annual, daily, hourly, or period-of-day basis.

The program's input data consists of three basic types:

1. traffic data which includes mileage, modal split (number by type) and average speeds;
2. emission factors for each mode which includes mileage factors, deterioration rates, speed corrections, vehicle age distribution, etc.; and
3. estimated changes due to vehicular turnover and other potential controls.

Three cases were evaluated, they were:

1. The emissions, in pounds of CO per day, as of Dec. 31, 1973. It is this total amount of CO that corresponds to the ambient air quality measurements presented as the base case. Since the air quality concentration of the pollutant is proportional to the emissions of that pollutant, it is this poundage that must be reduced by 73% in order that the NAAQS be met.
2. The projected emissions on Dec. 31, 1976 assuming that the only control strategy used is vehicle turnover.
3. The projected emissions on Dec. 31, 1976 assuming that vehicle turnover, and the following control strategies are used;
    a. automobile inspection,
    b. taxi inspection,
    c. truck inspection and retrofit,
    d. California Package for taxis, and
    e. mechanic training.

These control strategies are described below:

The automobile inspection program will require the periodic testing of emission systems on all vehicles. The program will attempt to screen out high emitters and to insure that the control systems, which deteriorate with age, still maintain some minimum standards. This will help to monitor the deterioration of these systems so that their emissions levels do not come to exceed those of uncontrolled vehicles.

The taxi inspection program will require that all for hire livery vehicles be inspected three times annually. It is expected that this will be a requirement for medallion and non-medallion taxis. The program will require that all air pollution devices be tested and replaced as necessary. The taxi and auto inspection programs are designed to prevent excessive deterioration of these devices.

The regulation of emission levels for new vehicles over 6,000 pounds GVW has lagged behind efforts to control light duty vehicle emissions. This program will require more stringent emissions guidelines for trucks, installation of emission control devices on older vehicles, and the periodic inspection of these vehicles to monitor the effectiveness of the devices.

An additional strategy applies to taxis. This will require all new livery vehicles to be equipped with the 1975 California Standard Emissions Controls. The package will produce the following emissions:

| | EXHAUST EMISSIONS GRAMS / MILE | | |
|---|---|---|---|
| | HC | CO | NO 2 |
| 1975 California Standard Model | 0.9 | 9.0 | 2.0 |
| 1975 Standard Model | 1.5 | 15.0 | 3.1 |
| Reduction | 40% | 40% | 35% |

Finally, a program, calling for the training of mechanics and their certification, is included in the control strategy package. Programs, which improve and evaluate the skills of mechanics, can be expected to have a beneficial impact on the reduction of air contaminant emissions from on-the-road vehicles. The mechanic training program is a comprehensive approach that should lead to increased motivation on the part of the individual mechanic to improve his abilities.

The results of the three cases summarize in Tables VII-2 thru VII-4. Table VII-2 shows that the total daily CO emissions from the Garment Center traffic is 1,399 pounds. To achieve a 73% reduction by December 31, 1976, 1,021 pounds must be eliminated. Table VII-3 shows that vehicle turnover alone eliminated 199 pounds, or 14% of the total emissions. Table VII-4 shows that vehicle turnover plus the A strategies results in CO emissions of 658 pounds, a 53% reduction.

However, this is not a sufficient reduction in CO emissions to result in a 73% reduction.. In fact, an additional 281 pounds of CO must be eliminated to achieve the required reduction, Thus, transportation use control strategies, in addition to the emission strategies listed, must be applied to motor vehicles. Given that emissions of a pollutant are proportional to Vehicle Miles Traveled, this goal would be almost met if all auto VMT were eliminated, since autos represent 277 pounds of the remaining daily CO emissions. The elimination of 93% of truck VMT would be another strategy, which would allow the standards to be met.

Thus, while emissions controls reduce CO emissions significantly, additional transportation controls must be rigorously applied to meet the Federal Air Quality Standards. Since these transportation controls will have to be severe, careful planning is needed so as to place the burden on those types of vehicles that can best afford to and can most easily adjust to restrictions.

## TABLE VII-2: EMISSIONS AS OF DECEMBER 31, 1973

| | lbs. CO/day | % of CO Emissions |
|---|---|---|
| Autos | 469 | 33.5% |
| Taxis | 197 | 14.1% |
| Trucks* | 728 | 52.0% |
| Buses | 5 | .4% |
| | 1399 | 100% |

## TABLE VII-3: EMISSIONS AS OF DECEMBER 31, 1976 - TURNOVER ONLY

| | lbs. CO/day | % of CO Emissions |
|---|---|---|
| Autos | 337 | 28.1% |
| Taxis | 186 | 15.5% |
| Trucks* | 672 | 56.0% |
| Buses | 5 | .4% |
| | 1200 | 100% |

## TABLE VII-4: EMISSIONS AS OF DECEMBER 31, 1976 - TURNOVER AND OTHER EMISSION CONTROL STRATEGIES

| | lbs. CO/day | % of CO Emissions |
|---|---|---|
| Autos | 277 | 42.1% |
| Taxis | 75 | 11.4% |
| Trucks* | 301 | 45.7% |
| Buses | 5 | .8% |
| | 658 | 100% |

* Almost all CO is produced by gasoline trucks 14000 lbs. or less. Diesel trucks produce very little CO. However, by increasing congestion in the Garment Center by their large size, they indirectly contribute significantly to CO emissions.

## VII.3 ESTIMATION OF THE HEALTH COST OF AIR POLLUTION

### VII.3.1 PREVIOUS STUDIES

Attempts to estimate the health costs of air pollution have been relatively limited and marked by a wide range of estimates and lack of agreement on assumptions, data, and methods. The most famous, by Lave and Seskin, (1) has limited application to this study because the health effects of only sulfur oxides and particulates were considered rather than pollutants which are primarily derived from vehicle exhausts. Furthermore, the attribution of the percent of total cost of disease categories (Cardiovascular, respiratory, and cancer) has been criticized as speculative and based on strong prior beliefs that air pollution causes significant health damage.(2)

An alternative approach, developed by William R. Ahern, Jr.,(3) seems better designed for estimating the costs of damage due to Garment Center truck emissions. Ahern's methodology follows the listed steps to determine the economic benefits to health from reducing auto vehicle emissions of carbon monoxide:

Step 1: Determine the automobile's contribution to concentration levels.

The author assumes that the automobile's contribution to concentration levels is the same as the percentage of the automobile contribution to carbon monoxide emissions.

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1 L. Lave and E. Seskin, "Air Pollution and Human Health", Science (August 21, 1970), pp. 723-733

2 See William R. Ahern, Jr. "Measuring the Value of Emission Reductions," in Henry D. Jacoby and John D. Steinbrunner, et.al., Clearing the Air (Cambridge, Massachusetts: Ballinger Publishing Company, 1973).

3 Ibid.

While this simplification ignores the very complex relationship determining concentrations at any particular place, it is frequently used as a simplifying assumption.[1]

Step 2: Determine the effect of various reductions in auto emissions on pollutant concentrations in the ambient air:

The procedure is to determine first the percentage of the time that concentrations exceed the national standard, under the assumption that lower levels do not affect health adversely[2] and second to assume that is the level of emissions is reduced by a certain percentage, the ambient concentrations are reduced by an equal percentage, i.e., a fifty percent reduction in emissions would reduce the length of exposure above the standard by fifty percent.

Step 3: Estimate the population exposed:

Exposure is assumed to be a function of pollutant concentration and duration.

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[1] As Ahern points out, the assumption would not be reasonable for photochemical oxidents, which are a secondary product of emissions of hydrocarbons and oxides of nitrogen. As a result of perverse and complex chemical reactions, a reduction of hydrocarbons can actually increase smog concentration levels.

[2] The validity of this assumption has been challenged. Donald N. Dewees, p. 25 states: "While the long term effects of exposure to ambient CO concentrations are unknown, in view of the known short-term effects, it appears that significant benefits would result from a reduction of emissions in heavy traffic areas. The benefits per unit of abatement either would be linear or would increase with increased density. It is not apparent whether there is a "safe" lower threshold level or not." However, Dewees does conclude that greater weight should be given to reducing the highest concentration levels. (p.31).

Step 4: Determine the damage to health due to exposure to pollutant concentrations:

This step disaggregates the population into categories of susceptability[1] to health conditions,[2] develops a common measuring rod for estimating damage,[3] surveys a panel of medical experts to determine the effects of exposure on health, and aggregates the amounts of damage reduction for different levels of emissions reductions.

Step 5: Estimate the dollar value of the damage reduction:

Alternative measures of the monetary costs of the measure of health damage can be produced by varying the assumed willingness to pay to prevent restricted activity due to air pollution.

Ahern's estimates of the range of the costs of automobile air pollution are shown in the following Table.[4] The range in the estimated benefits are due to the extreme difference of opinion by medical experts on the health benefits of reduced concentrations. of CO and to the different threshold levels chosen in estimating the health effects on healthy people. Because the experts employed by Ahern acted on the assumption of a threshold of health effects (i.e., health effects are caused by exposure to high concentrations, but not cumulative exposure to low concentrations), the benefits of reducing emissions diminishes rapidly. In the present case, reducing emissions by 50% avoided

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[1] Chronic, acute, and healthy

[2]. Asthma and hay fever, heart conditions, etc.

[3]. The estimated day of restricted activity (EDRA). This measurement indicates the substantial reduction in normal activity of a person on a particular day due to a specific illness or injury.

[4]. His low valuations based on the cost of Alka Seltzer seem ridiculous and are omitted. The higher estimates are substantially higher than the $2.08 billion estimate of the total costs of sulfur oxides and particulates estimated by Lave and Seskin. Indeed, they are higher than total costs of pollution-related diseases estimated by some researchers

Table VII-5:

ESTIMATES OF THE NATIONAL COST OF HEALTH EFFECTS ATTRIBUTED TO CARBON MONOXIDE IN 1967 ($ MILLIONS)

| | Cost of 1967 Concentration Levels | Benefits From Fifty Percebt Reduction from 1967 Concentration |
|---|---|---|
| Low Health Effect Estimate | $ 1,020 | $ 760 |
| High Health Effect Estimate | $15,300 | $14,880 |

Source: Ahern, op. cit., pp. 203, 204.

from 74.5[1] to 97.2[2] percent of the total costs.

### VII.3.2 Application of Ahern's Results to the Garment Center

Ahern's estimates of the health effects from carbon monoxide auto emissions provide a reasonable basis for estimating the economic costs imposed by truck CO emissions in New York City's Garment Center. The estimation procedure is as follows:

### VII.3.2.1 Estimate the Percentage of Total Carbon Monoxide Emissions In the Garment Center from Truck Sources

An estimate of the contribution of trucks to total vehicle CO emissions can be made using the emissions estimates provided by the New York City Department of Air Resources. Using data on on typical weekday traffic levels by type of vehicle and estimates of typical vehicle speeds by location and time of day, and making certain assumptions about the age and weight destribution of the stock of vehicles, the DAR applied carbon monoxide emission factors to estimate 1973 CO emissions by type of vehicle and by location[3] and time of day. These data can be summarized to estimate the percent contribution of trucks to CO emissions[4].

---

[1] (760/1021 = .745).

[2] (14,880/15,300 = .972).

[3] The locations considered are the 13 sites where air quality tests were performed.

[4] The categories, trucks, includes trucks of all sizes, i.e., gas trucks in the size categories less than 6,000 lbs., 6,000-14,000 lbs. and over 14,000 lbs. and diesel trucks.

Tables VII-6 and VII-7 present these estimates by hour of day and by location respectively. Figure VII-1 compares truck and total emissions by hour of day. As expected, trucks are a major source of CO emissions during the period between the morning and evening rush hours: the relative contribution of trucks drops off sharply after 5:00 P.M. The contribution of trucks also varies by site within the Garment Center. It would appear that trucks are the predominate source of CO emissions in the core of the Garment Center,i.e., on the cross-streets (35th to 38th Streets) between 7th and 8th Avenues, and are somewhat less important outside that area.[1]

Averaging the percentage figures in Tables VII-6 and VII-7 would suggest that 50% of CO emissions in the Garment Center are attributable to trucks. A simplifying but reasonable assumption is that the percentage contribution of trucks to ambient air quality is the same as the percent contribution to total emissions. Since assuming with Ahern, that carbon monoxide pollution is a problem of both the level and duration of peaks, this is probably a conservative assumption. Peak ambient CO levels are generally

---

[1] For the purposes of this analysis, only locations close to the core of the Garment Center are considered, i.e., in the area bounded by 35th and 39th Sts., Broadway and 8th Ave. since our main interest is in evaluating the contribution of garment industry related traffic. While no data are available on the proportion of truck activity associated with the garment industry, it can be confidently assumed that most truck traffic (perhaps 80%) in the area is associated with the garment industry. Outside that core area, on 10th Ave. for example, a smaller and unknown proportion of truck traffic is attributable to garment industry activity. Data for those locations were, therefore, excluded in this analysis

## Table VII-6:
## CONTRIBUTION OF TRUCKS TO TOTAL CO EMISSIONS IN THE GARMENT CENTER, BY HOUR
(as a percent of total vehicle CO emissions in lbs)

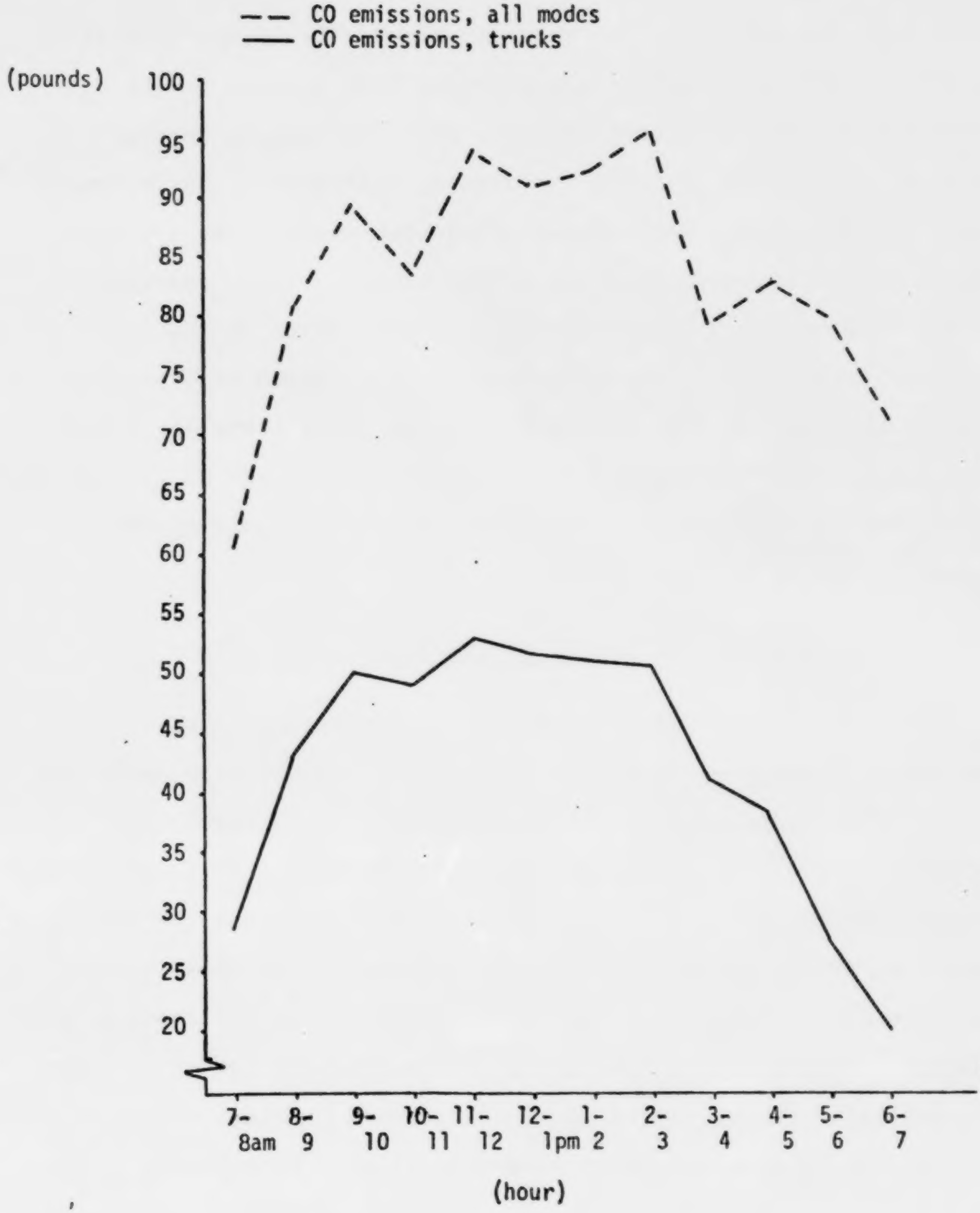
| Hour: | 7-8 a.m. | 8-9 | 9-10 | 10-11 | 11-12 | 12-1 p.m. | 1-2 | 2-3 | 3-4 | 4-5 | 5-6 | 6-7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Percent Contributed by Trucks: | 47 | 53 | 56 | 58 | 57 | 57 | 56 | 54 | 53 | 46 | 34 | 28 |

## Table VII-7:
## CONTRIBUTION OF TRUCKS TO TOTAL CO EMISSIONS IN THE GARMENT CENTER, BY LOCATION
(as a percent of total vehicle CO emissions in lbs)

| Location: | 7th Ave. (37th-38th) | 39th St. (7th-8th) | 8th Ave. (36th-37th) | 36th St. (7th-8th) | 35th St. (7th-8th) | 38th St. (7th-8th) | 37th St. (7th-8th) | Broadway (at 38th St.) |
|---|---|---|---|---|---|---|---|---|
| Percent Contributed by Trucks: | 41 | 43 | 39 | 52 | 69 | 67 | 55 | 41 |

## Figure VII-1

Typical Total Hourly CO Emissions
for Locations in the Garment Center

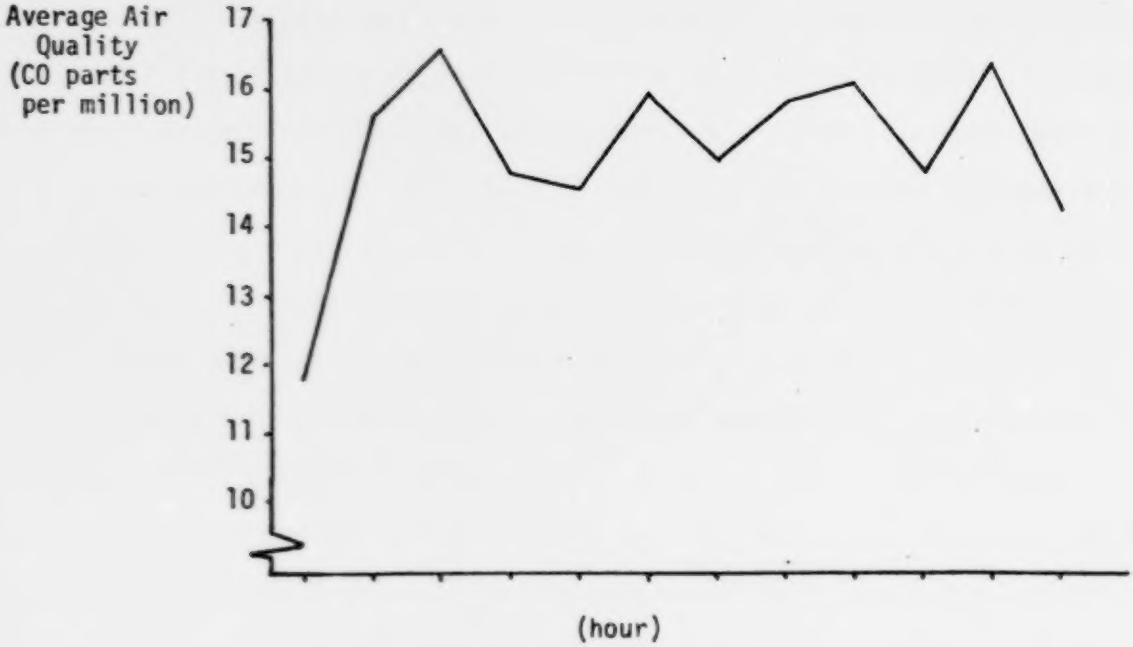


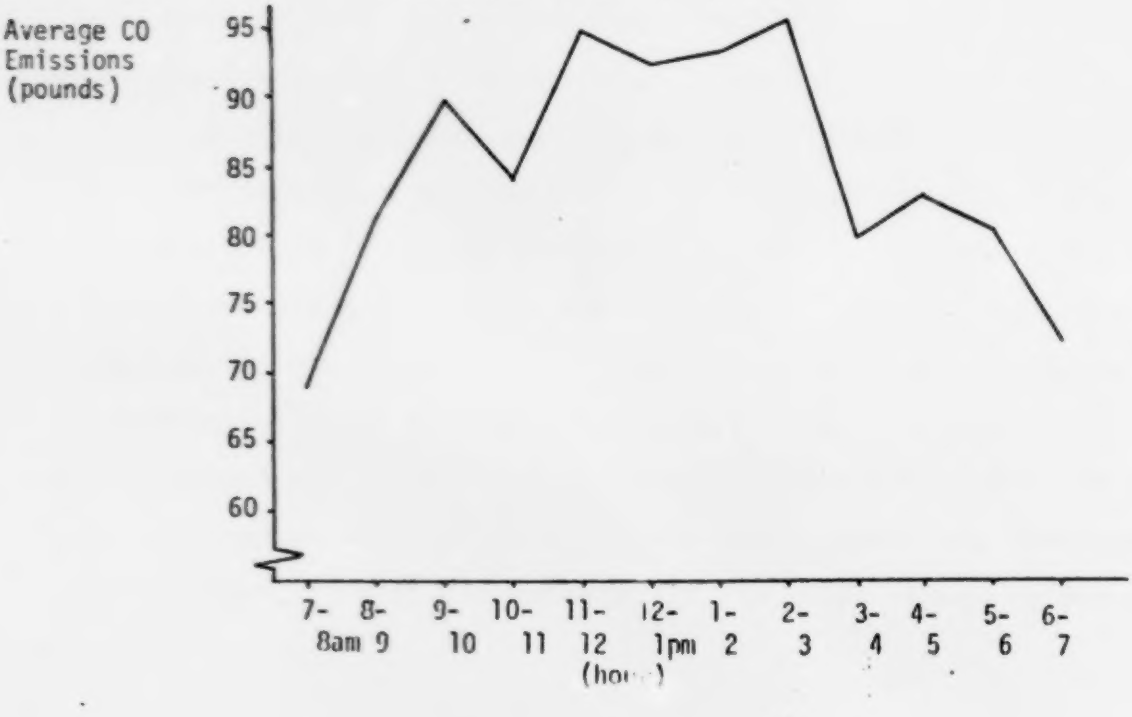
experienced between 9:00 A.M. and 6:00 P.M. (see Figure VII-2), while the relative contribution of trucks is highest between 9:00 A.M. and 4:00 P.M. As shown in Figure VII-2, the Garment Center is characterized by consistently high ambient levels of carbon monoxide throughout the day, with the highest levels reached during the morning and evening rush hours. While trucks are relatively less important at those two peaks, they are the major contributors to the high midday levels. Thus, reducing truck traffic might have relatively little impact on the peak CO levels recorded during rush hours, but it would be likely to reduce the high ambient levels during the rest of the day. When the impact of truck traffic on the duration of peaks is considered, 50% seems a reasonable and even conservative estimate of the contribution of trucks.

### VII.3.2.2 Estimate The Impact of Truck Emissions

Assume that over the range of concentration levels relevant to truck emissions, a one percent reduction is emissions will avoid two percent of the costs of the per capita health effects of exposure to carbon monoxide. This is equivalent to the decreasing returns feature due to the assumption that the health costs of carbon monoxide are due to concentrations above some threshold. Hence initial reductions in emissions will have a more than proportional effect on health costs. As the number of hours during which the threshold level is exceeded declines, further reductions in emissions have a decreasing impact on health costs.

Figure VII-2


Ambient Air Quality: CO Levels for Locations in the Garment Center


Total CO Emissions, All Modes, for Locations in the Garment Center

### VII.3.2.3 Estimate The Economic Per Capita Cost

It is assumed that the economic costs per capita of carbon monoxide exposure are to be measured by the High Health Effect Estimate. Using Ahern's high estimate seems reasonable for the following reason. Ahern's estimates are based on his calculation of the ambient carbon monoxide level profile of a representative central city. He calculates the number of hours per year during which different carbon monoxide readings above a certain level can be expected to prevail. His estimates, based on data from CAMP (Continuous Air Monitoring Program) stations in eight major cities, are shown in Table VII-8. This assumed distribution underlies Ahern's estimate of the total ERDA's (Estimated Days of Restricted Activity) used to calculate national health costs. Therefore, the extent to which this distribution is a fair representation of conditions in the Garment Center will determine the usefulness of Ahern's per capita estimates for our purposes.

Data provided by the air monitoring project undertaken in the Garment Center permit a test of the reasonableness of this distribution. It should be emphasized that the results of this comparison are highly tentative. For most of the 13 test locations, air quality tests were conducted for only short periods and only on weekdays. It is therefore difficult to reach firm conclusions about the complete profile of carbon monoxide levels throughout the district. Nonetheless, these data do permit the conclusion that conditions are significantly worse in the Garment Center than those assumed by Ahern. His calculations suggest that the Federal Air

## Table VII-8

## DISTRIBUTION OF CARBON MONOXIDE LEVELS FOR A REPRESENTATIVE CAMP STATION IN 1967

| Range of Eight-Hour Average CO Readings (parts per million) | Approximate Number of Total Hours in the Year that Fell Within Averaging Periods for Which Observed Concentrations were Present |
|---|---|
| 11.5-12 | 600 |
| 12-18 | 800 |
| 18-24 | 80 |
| 24-39 | 10 |
| Total Hours in which a level of 11.5 ppm was exceeded | 1490 |

Source: Ahern, *op. cit.*, p. 181.

Quality Standard for 8-hour average CO levels is exceeded approximately 17% of the time in the representative center city.[1]

However, the results of the Department of Air Resources' analysis show that 8-hour average concentrations exceeded 9 ppm on 60 of the 72 days for which such averages were computed. Furthermore, this result includes readings taken at all 13 sites, including 6th Avenue (on the periphery of the Garment Center), where the 8-hour standard was exceeded only once in the 5 days tested. Table VII-9 presents the results of a calculation similar to Ahern's using data from the core Garment Center air testing sites. These data and the methods used to estimate this distribution are described in the Appendix at the end of this chapter. While these estimates are very rough, they are generally conservative. It is clear that both the concentration levels and the duration of carbon monoxide peaks are more severe in the Garment Cneter than was assumed by Ahern for the representative center city. Thus this study will use the high estimate of 1967 per capita costs.

### VII.3.2.4 Adjust Costs For The Study Year

The next step is to convert the estimate of 1967 per capita pollution costs to account for inflation during the intervening years. The Consumer Price Index (100.0 in 1967 and 133.1 in 1973) is used to convert Ahern's cost estimates to 1973 price levels.

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[1] This is an underestimate to some extent because his data include only readings of 11.5 ppm and over. The Federal Standard requires that an 8-hour average of 9 ppm not be exceeded more than once a year. This percent was calculated by dividing the sum of hours in which the level of 11.5 ppm is exceeded by 8760, the total number of hours in a year.

## Table VII-9:
## ESTIMATED DISTRIBUTION OF CARBON MONOXIDE LEVELS FOR THE GARMENT CENTER, 1973

| Range of Eight-Hour Average CO Readings (parts per million | Approximate Number of Total Hours in the Year that Fell Within Averaging Periods for Which Observed Concentrations were Present |
|---|---|
| 9-11.5 | 180 |
| 11.5-12 | 45 |
| 12-18 | 1170 |
| 18-24 | 380 |
| 24-39 | 135 |
| Total Hours in which a level of 9 ppm was exceeded | 1910 |

The 1967 national estimate of health costs is $15,300 million. This represents a per capita cost of $133 per year.[1] Inflated to 1973 price levels, this estimate becomes $177 per person per year.

As suggested in the previous discussion of Ahern's approach, this estimate seems rather high. One factor should be kept in mind in using these results. The majority of the total ERDA's calculated by Ahern are suffered by healthy people. Even using the highest estimates of ERDA's for people with acute and chronic conditions, only 35,000 ERDA's are attributed to the effects of carbon monoxide on the non-healthy population, as opposed to 1.42 million ERDA's for the healthy population. The latter estimate is based on the arbitrary assumption that 50 hours of exposure to levels exceeding the Federal 8-hour standard are equal to one ERDA. Thus, the assumption used to convert hours of exposure to high CO levels into ERDA's can have a significant impact on the per capita health costs ultimately attributed to such exposure.

While Ahern's estimate is to a large extent arbitrary, there are no data currently available which would suggest specific improvements. Therefore this study uses Ahern's figure as an estimate of the upper bound for per capita health costs.

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[1] This is equal to $15,300 million divided by 114,525,000 the population living in either the central city or the suburbs in 1967. Note that Ahern's analysis assumes that there are no health effects suffered by persons living in places other than central cities or suburbia, i.e., outside SMSA's.

### VII.3.2.5 Estimated Total Cost Savings Possible

The next step is to multiply the estimated cost savings per capita times the population exposed to Garment Center emissions. Once an estimate of per capita health costs attributable to high carbon monoxide levels has been made, the population at risk in the Garment Center is to be estimated. In theory, this estimate should include persons employed in the District, persons residing in the District and persons passing through the District in vehicles. The latter group is the most susceptible, since carbon monoxide levels are believed to drop off sharply as the distance from the emission source increases.[1] Precise data are not available with which to make such an estimate, but as a lower bound, an estimation is that between 96,000 to 116,000 individuals are regularly exposed to daytime carbon monoxide levels in the Garment Center area.

This is based on the fact that approximately 161,000 persons are employed in the area between 30th and 42nd Streets and between 5th and 9th Avenues.[2] This area extends somewhat beyond the core of the Garment Center, it might be estimated that from 80,000 to 100,000 persons are employed in the smaller area between Broadway and 8th Avenues and between 35th and 41st Streets. The garment industry itself employs approximately

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1. For instance, one study suggests that CO concentrations are highest in vehicles moving in traffic and may drop off by as much as one half at the curb of the same street. See Donald N. Dewees, op. cit., p. 39. Because the impact of carbon monoxide is thought to be highly concentrated geographically, the assumption is that costs are localized, i.e., that there are no health costs borne outside the Garment Center as a result of emissions generated within the District.

2. Information from the land use and economic survey.

80,000 persons. Another 16,000 persons in vehicles are assumed to be exposed to Garment Center carbon monoxide levels during the course of an average week day. This is estimated from traffic data obtained during the cordon counts made during the summer of 1973. These data show that over 180,000 vehicles enter the District on a typical weekday and that the number of vehicles within the boundaries of the District at a single point in time (between 9:00 A.M. and 6:00 P.M.) varies between approximately 7,000 and over 15,000. Assuming conservatively that each vehicle contains 1.5 persons, then 10,500 to 22,500 persons are exposed to Garment Center carbon monoxide levels per day.

This exaggerates the exposure of persons in vehicles, of course, since duration as well as peaks in exposure determine health costs. In general, any particular person in a vehicle is exposed to those levels only for the time he is in the District. Therefore, two people exposed for one half day is not equivalent to one person exposed for the entire day. This analysis will use the average of the two figures (16,500) to estimate the exposure of vehicle drivers to Garment Center carbon monoxide levels.[1]

---

[1] If most persons travelling through the Garment Center in vehicles came from and returned to relatively pollution-free environments, treating eight persons exposed to Garment Center CO concentrations as the equivalent of one "person" exposed for eight hours would result in a serious over-estimate of exposure. However, since most vehicle passengers in this area are probably exposed to fairly high ambient CO levels during a good part of the day, the figure is probably reasonable.

### VII.3.2.6 Summary of Ahern's Approach Applied to the Garment Center

A conclusion is drawn from this rough estimate of the number of persons exposed as to the health costs of CO emissions in the Garment Center, it is that the maximum health costs range from \$17.0 million to \$20.5 million. This estimate is calculated as follows:

[\$177 per capita per year] X [96,000 to 116,000 persons at risk] = \$17.0 million to \$20.5 million

If 50 percent of all CO health costs are attributable to trucks, then health damages of between \$8.5 million and \$10.2 million may be said to be caused by Garment Center truck activity. Finally, the analysis indicates (using the results of VII.3.2.2) that a one percent reduction in Garment Center truck emissions would save between \$170,000 and \$204,000 in health damages, as a result of reduced carbon monoxide emissions alone.

It should be emphasized once again that this is an estimate of the maximum savings and that it rests on a number of highly tentative assumptions. The most critical of these assumptions is that 50 hours of exposure to high levels of carbon monoxide are equivalent to one ERDA and that there are no health costs incurred as a result of prolonged exposure to carbon monoxide levels below some threshold level.

## VII.4 AMBIENT NOISE CONDITIONS

### VII.4.1 INTRODUCTION

Monitoring of the ambient noise levels was also conducted in the Garment Center as part of the environmental efforts of the study. The purpose of this monitoring was to determine if the level of goods movement activity has any discernable effect on noise levels. A Department of Noise Abatement mobile van was used to collect data. Wide-band tape recordings were made at various sites, either mid-block (crosstown streets or avenues) or at intersections.

Since noise levels generally fluctuate with traffic light cycles, five minute samples were used. A complete traffic light cycle in this area takes 1 $\frac{1}{2}$ minutes, so that these samples include more than three complete cycles. A forty (40) minute sample of data was taken on 38th Street between 7th and 8th Avenue to test the validity of the five minute dampling approach. These data were then grouped into seven five minute samples and each was analysed separately. These data yielded $L_{10}$, $L_{50}$ and $L_{90}$[1] readings of 76 dBA, 71 dBA and 68 dBA respectively. The variation between samples was approximately 1.5 dBA. These variations of only a few dBA are not considered statistically significant.

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[1] $L_{10}$, $L_{50}$ and $L_{90}$ are the noise levels that are met or exceeded 10%, 50% and 90% of the samples, respectively. $L_{10}$ is indicative of peak noise levels. $L_{50}$ is indicative of the typical noise levels. $L_{90}$ is indicative of the background noise levels.

[2] The dB scale is a logarithmic scale used to measure sound intensity. An increase of 10 dB in noise represents a 10 fold increase in sound energy. The A weighting deemphasizes high and low frequency sounds and more nearly represents human preception of noise.

A Statistical Distribution Analyzer was used on the data that was collected to develop the $L_{10}$, $L_{50}$ and $L_{90}$ estimates. Used in the cumulative mode, this device provided counts of the number of times that a particular discrete sound level was exceeded. The Analyzer was operated using a sampling rate of 10 per second.

## VII.4.2 FINDINGS

Average values for sound levels measured on avenues were as follows; $L_{10}$ = 79 dBA, $L_{50}$ = 73 dBA and $L_{90}$ = 69 dBA. There is no marked difference between the noise levels in the Garment Center and the peripheral areas. Sound levels do not vary between intersections and midblock locations on the avenues.

The average values for cross-streets for the entire area were as follows; $L_{10}$ = 76 dBA, $L_{50}$ = 70 dBA and $L_{90}$ = 67 dBA. Noise levels on 34th and 42nd Streets, which carry through traffic, were similar to those on the avenues rather than on the cross-streets. Cross-street levels are often several dBA below corner levels. Spatially averaged data are presented in Figures VII-3 to VII-5.

The highest intrusive level $L_{10}$ = 81 dBA was recorded on 10th Avenue. This is attributable to the acceleration of heavy trucks, which frequently produce levels in excess of 90 dBA for several seconds. This can be compared to Park Avenue where the lowest avenue $L_{10}$ was recorded at 77 dBA. Commercial traffic is restricted from Park Avenue so that noise is primarily from cars and taxis. Although peak levels are lower, the $L_{90}$ level is the same. Noise levels in the Garment Center lie between these extremes.

Cross-street noise levels are lower toward the West Side and in the area from 8th to 11th Avenues and from 43rd to 46th

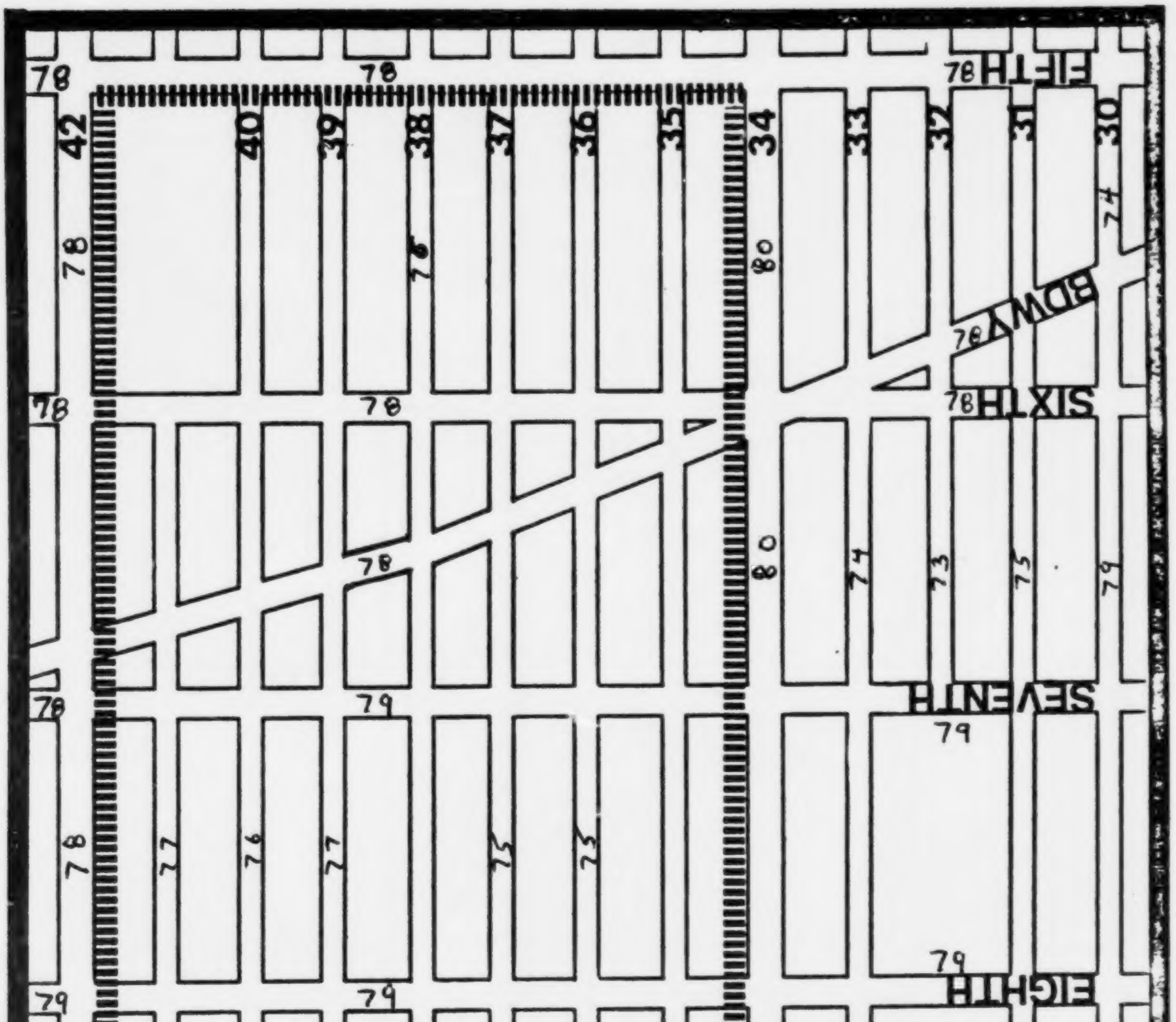

Figure VII-3 : $L_{10}$ dBA Levels in the Garment Center

Source : Bureau of Noise Abatement

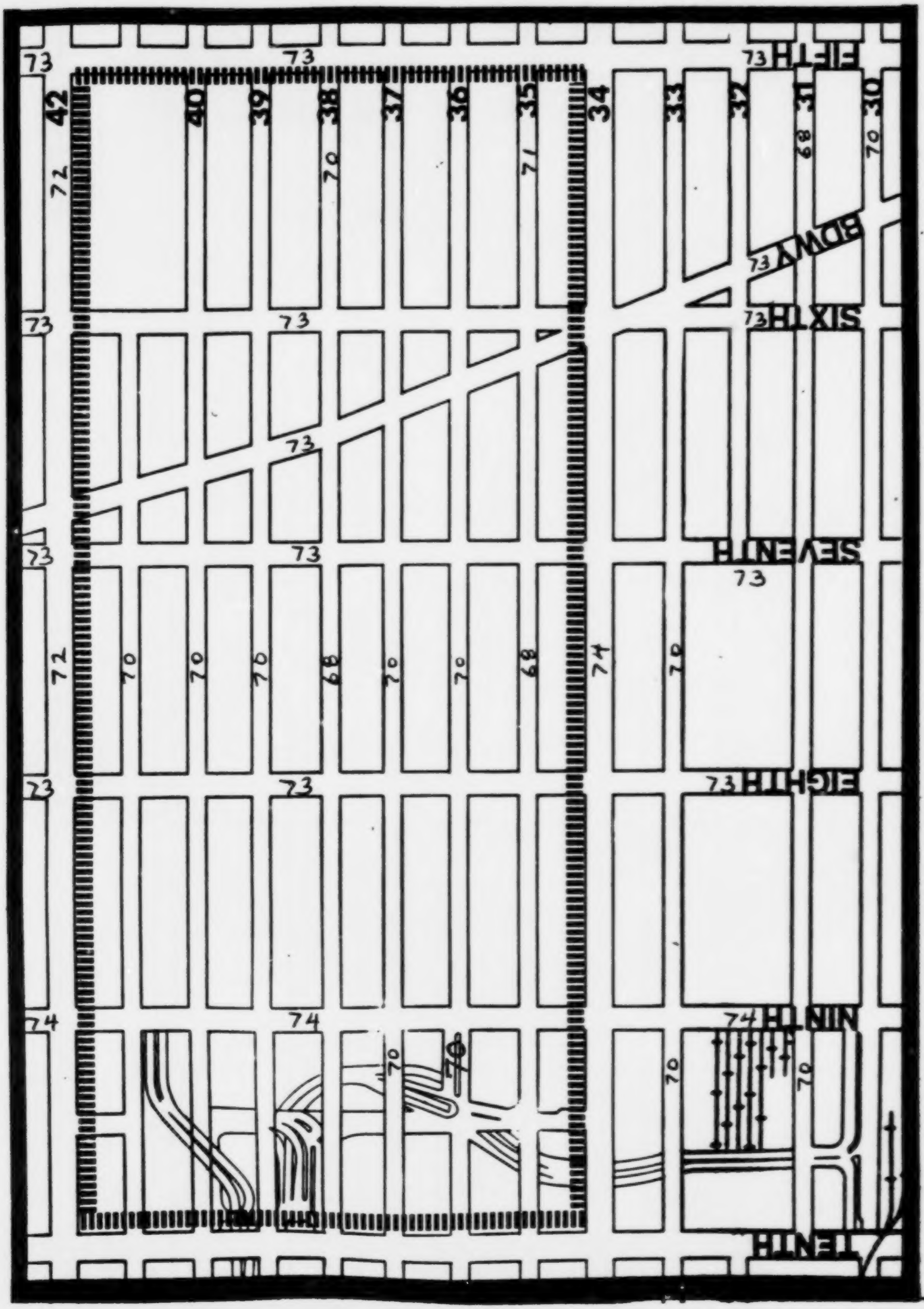

Figure VII-4: $L_{50}$ dBA Levels in the Garment Center

Source: Bureau of Noise Abatement

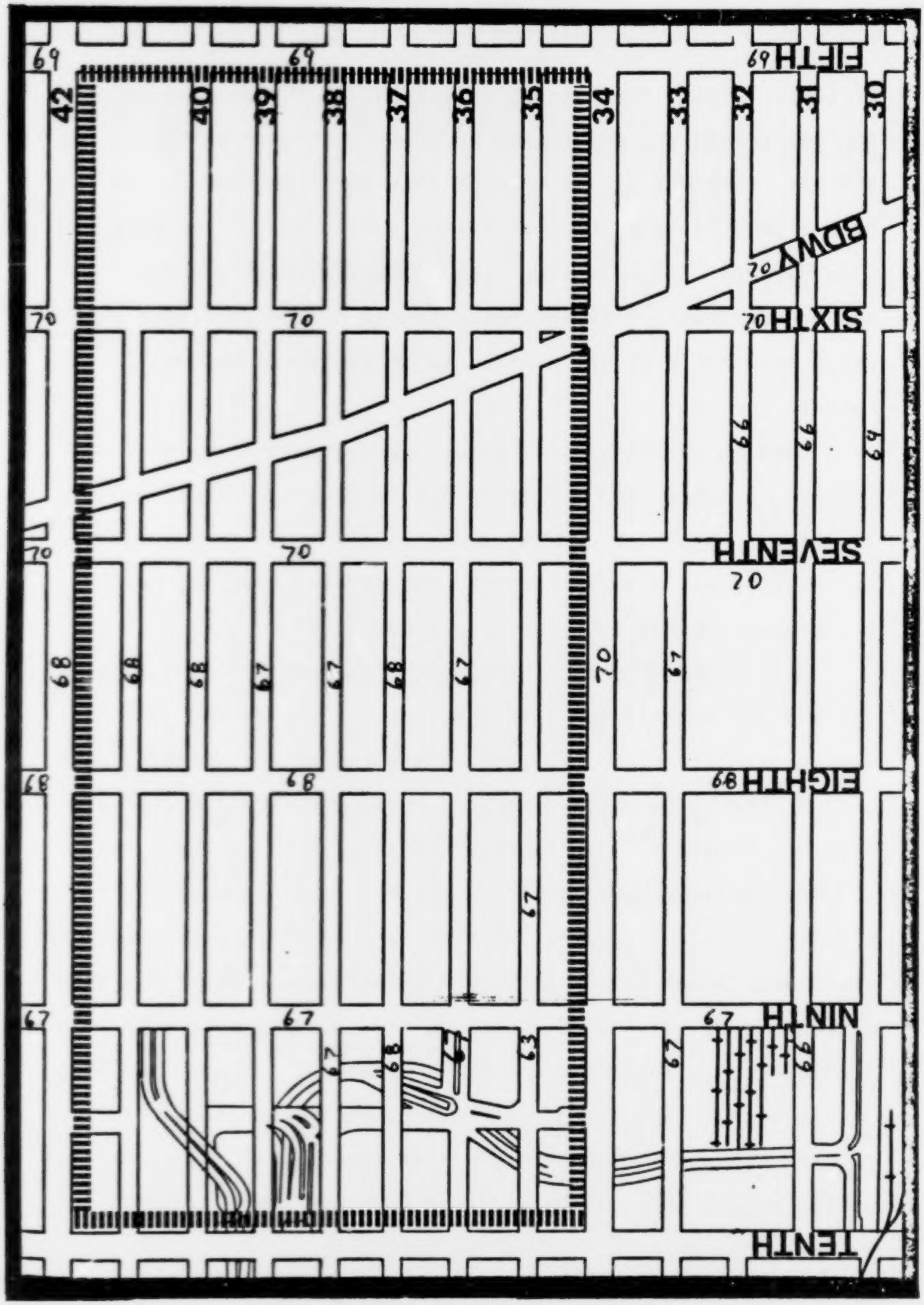

Figure VII-5: $L_{90}$ dBA Levels in the Garment Center
Source: Bureau of Noise Abatement

Streets. Cross-street traffic is light in these areas and ambient levels are determined by noise generated on the avenues. Ambient levels between 11th and 12th Avenues are higher than between 10th and 11th Avenues, due to the West Side Highway. At this time the Highway is partly closed due to structural deficiencies. Levels in the remainder of the peripheral area are similar to those in the Garment Center.

Some data were also taken during a strike of garment workers, which caused a significant reduction in trucking activity in the area. Cross-street traffic was moving freely and parking was available during the strike, however, no significant change in noise levels was noted.

Data taken over a 24 hour period at 36th Street between 7th and 8th Avenues and 11th Avenue between 36th and 37th Streets is displayed in Figures VII-6 and VII-7. Traffic on 36th Street is composed mainly of cars, vans and intermediate trucks. During the day the traffic is very heavy and moves slowly. Eleventh Avenue carries heavy trucks in addition to lighter vehicles. Traffic density is generally light enough that trucks can reach speeds of 30 mph to 40 mph. Under these conditions, tire noise accentuated by the cobblestone pavement produces peak levels frequently in excess of 90 dBA. The noise level data on 11th Avenue show a greater spread between the $L_{90}$ and $L_{10}$ curves than for the 36th Street data. This is due to the higher peak levels produced by these heavy trucks.

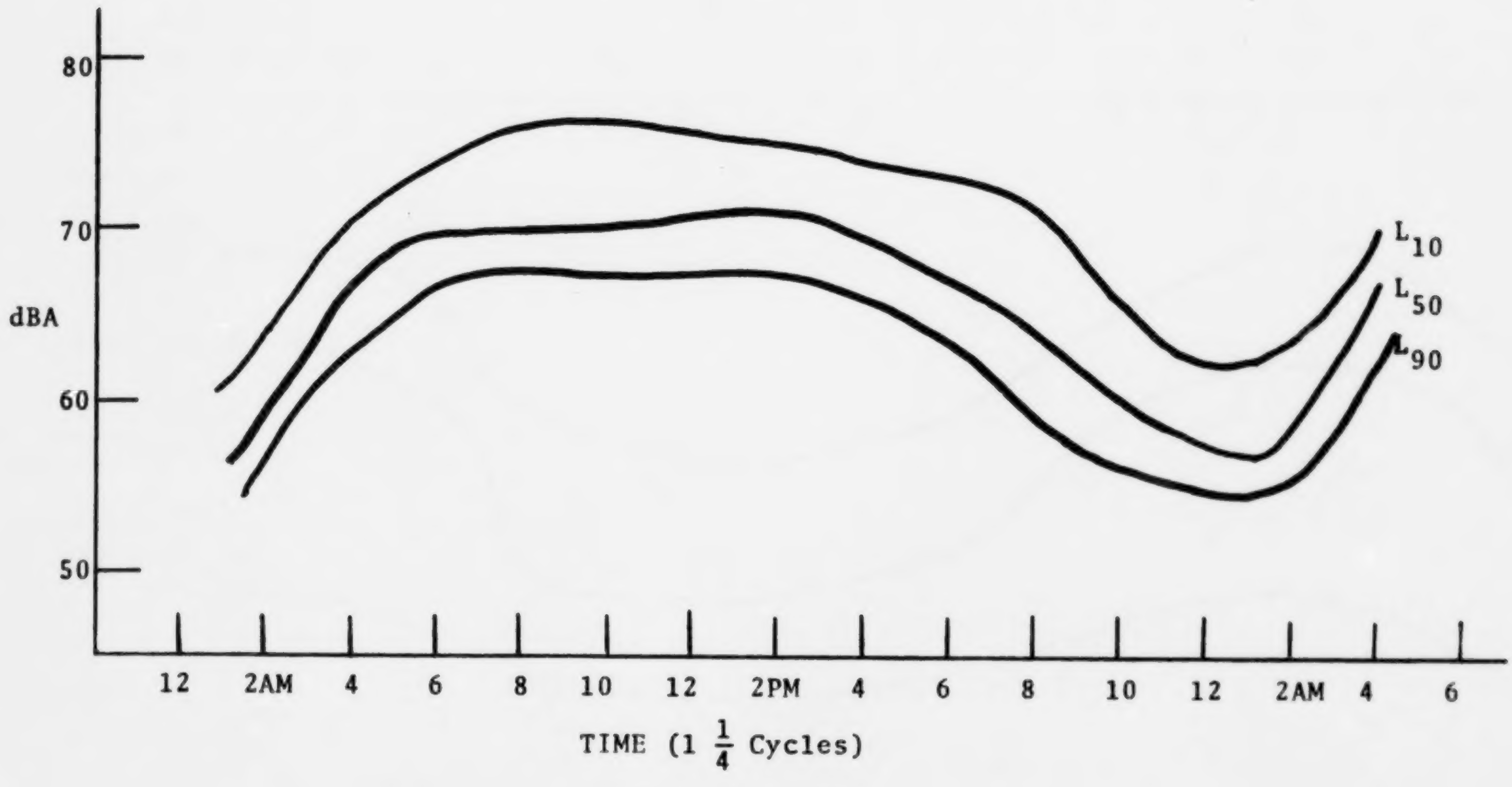

Figure VII-6: Sound Pressure Level vs Time (36th Street, 7th - 8th Avenues)

Source :Dureeau of Noise Abatement

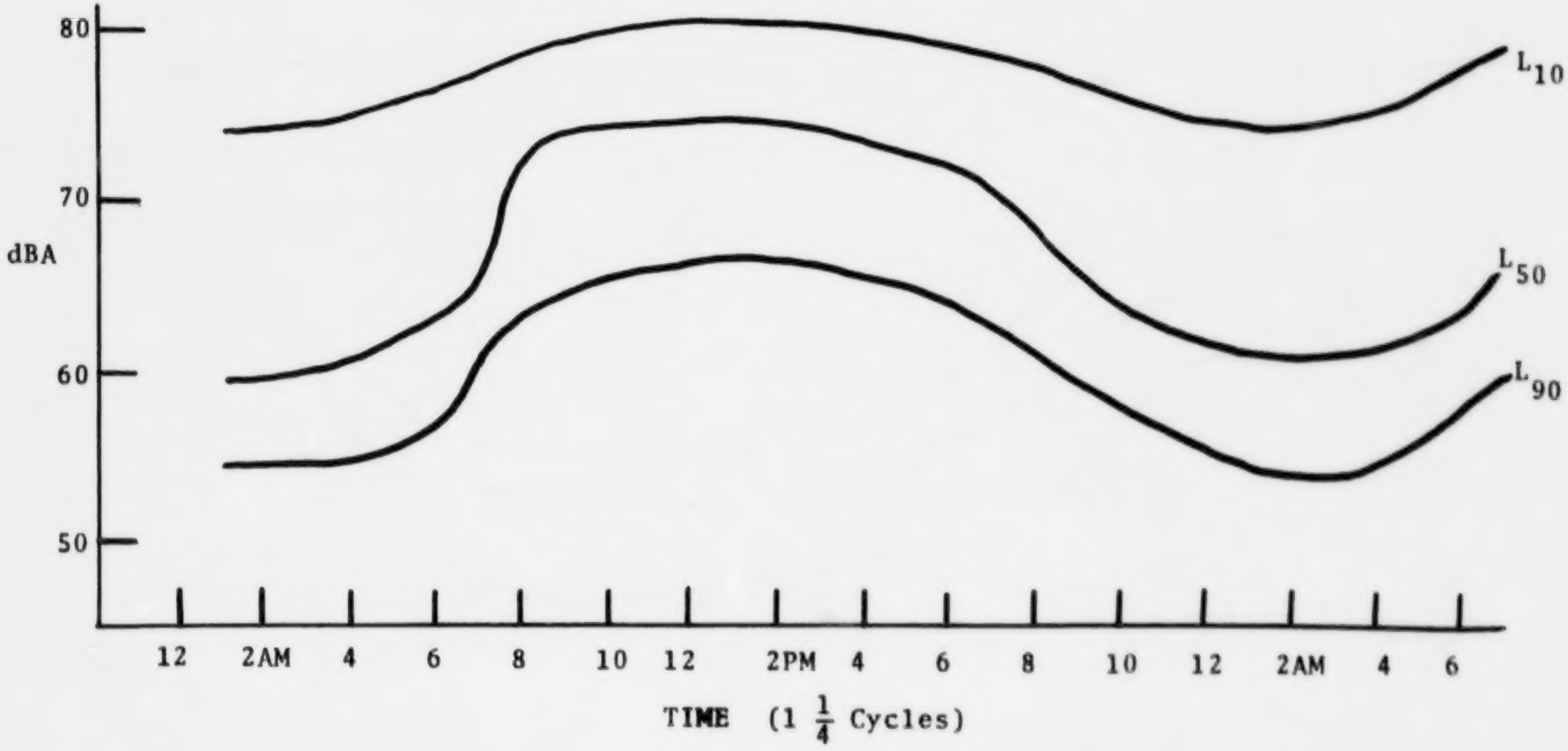

Figure VII-7: Sound Pressure Level vs Time (11th Avenue, 36th-37th Streets)

Source: Bureau of Noise Abatement

Traffic data for 36th Street between 7th and 8th Avenues are plotted in Figures VII-8 and VII-9. Figure VII-8 are the traffic volumes from machine counts averaged over 23 weekdays. Figure VII-9 is based on a one day observation and provides data regarding the type of vehicles which make up the traffic.

These data taken on 36th Street can be used to examine the relationship between traffic noise and traffic volume. Figure VII-10 shows a plot of $L_{10}$ versus traffic volume. There are two separate curve segments representing the intermediate traffic volumes. The upper curve is data occurring during the morning traffic buildup, 4:00 A.M. to 8:00A.M. The points on the lower curve occur during the evening traffic decline, 5:00 P.M. to 11:00 P.M. The gap between the two curves is the difference between the morning $L_{10}$ and the evening $L_{10}$ for the same traffic volumes. Figure VII-9 indicates that the volume of vans and two axle truck traffic is higher in the morning than in the afternoon, and very low after 5:00 P.M. It is apparent that the car-truck mix is the factor responsible for the difference between the two curves.

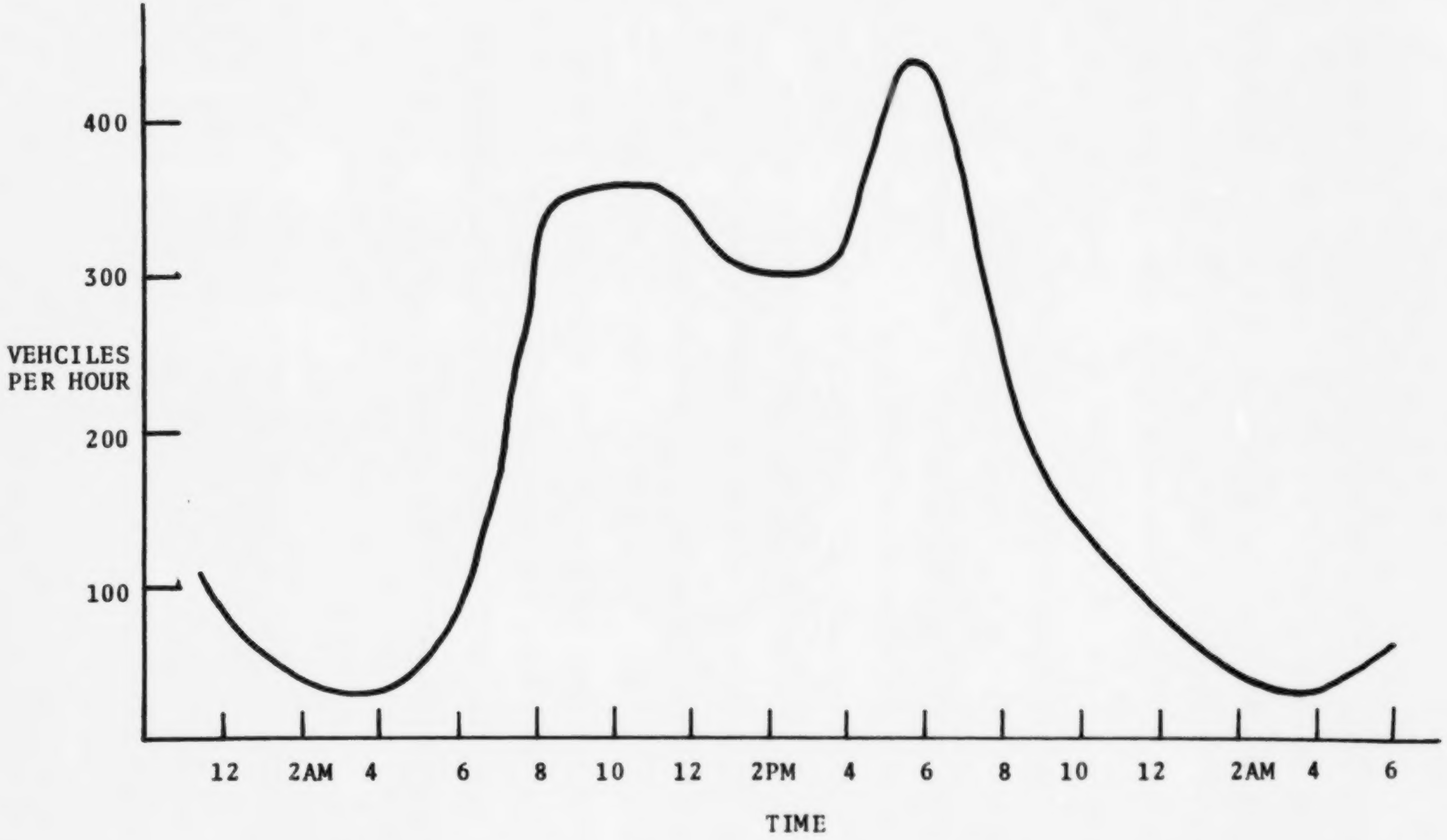

Figure VII-8: Traffic Volume vs Time (36th Street, 7th-8th Avenues)

Source: Bureau of Noise Abatement

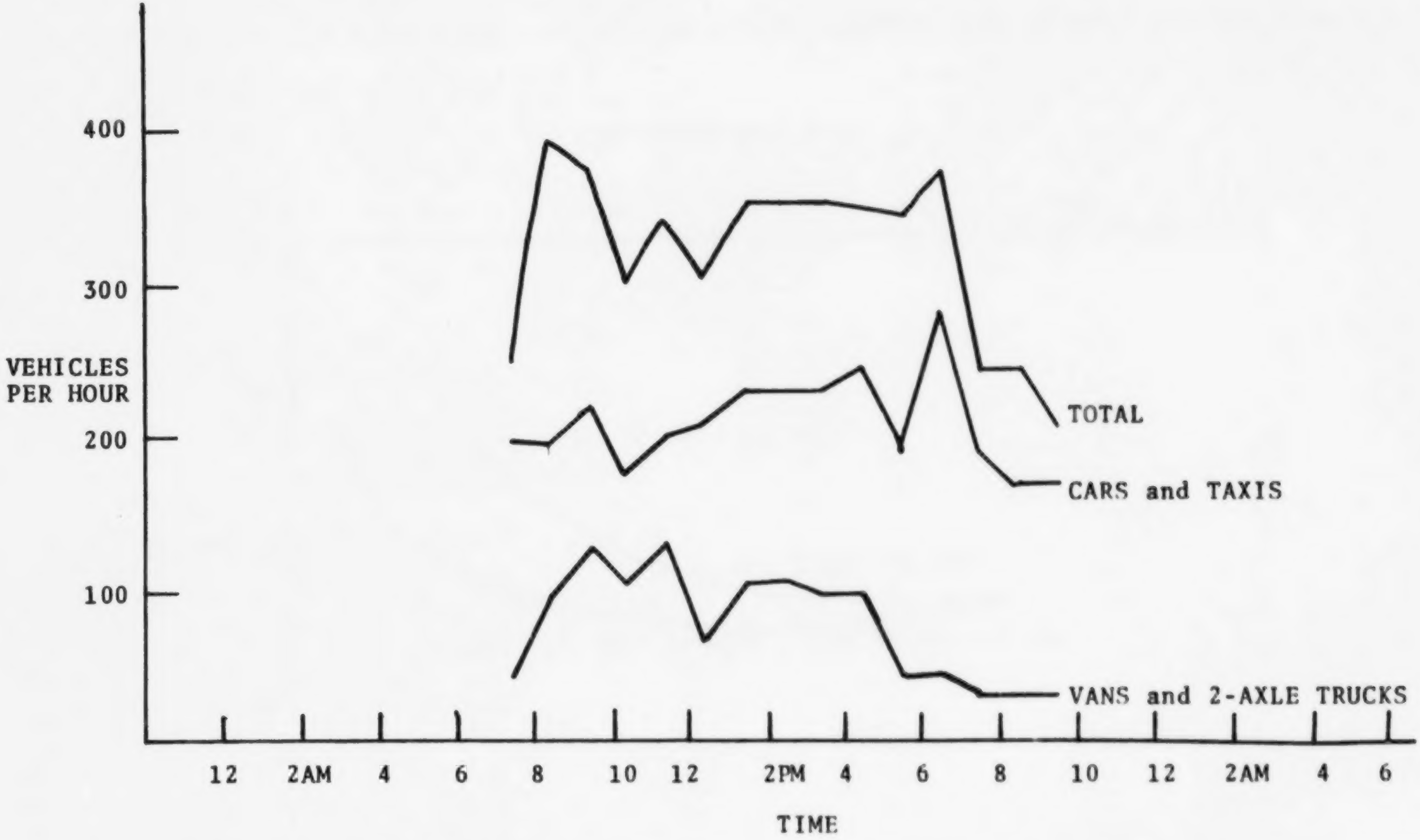

Figure VII-9: Traffic Volume vs Time (36th Street, 7th-8th Avenues)

Source: Bureau of Noise Abatement

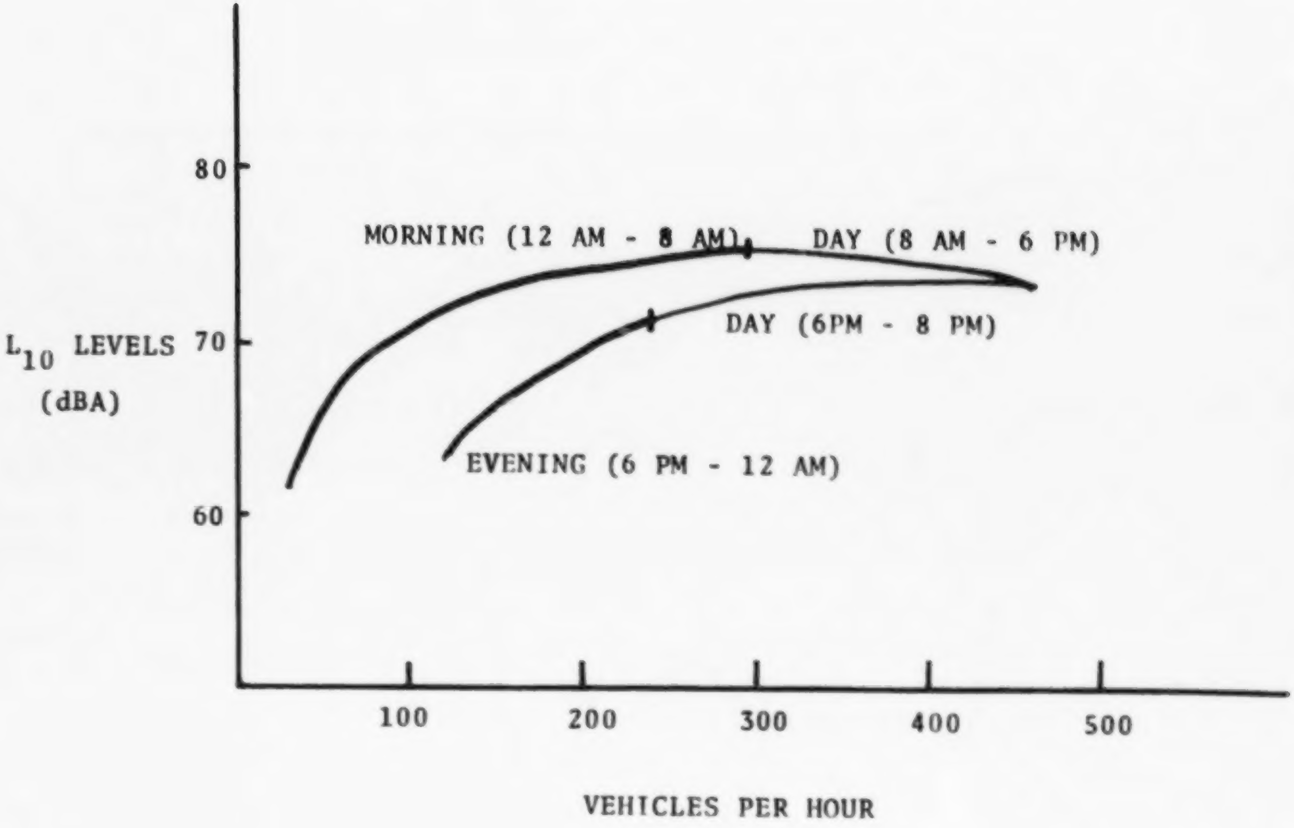

Figure VII-10: $L_{10}$ vs Traffic Volume (36th Street, 7th-8th Avenues)

Source: Bureau of Noise Abatement

### VII.4.3 SUMMARY

The analysis of noise levels and traffic data indicates that the contribution to overall noise levels varies by vehicle type. Intermediate and heavy truck contribute proportionately more to the noise levels than cars and vans. On the whole, however, the noise levels do not seem to be very responsive to changes in traffic volumes. For example, a reduction of daytime volumes by 100% can be seen to result in a reduction in the $L_{10}$ of only 1 dBA or 2 dBA, not a significant change. The $L_{50}$ and $L_{90}$ readings would react similarly since their time dependence is comparable to that of $L_{10}$. This would appear to indicate that current noise levels can not be appreciably altered by changes in traffic volumes or mix.

## VII.5 THE RELATIONSHIP OF VEHICULAR ACTIVITY AND CONGESTION TO ACCIDENT COSTS IN THE NEW YORK CITY GARMENT CENTER

### VII.5.1 INTRODUCTION

An analysis was made of the impact of Garment Center vehicular activity on the cost of accidents occurring in the area. Data were compiled on accidents in the area from the New York City Police Department printouts showing numbers of accidents by type and by location for 1973. Data on traffic levels by type of vehicle and on numbers of pedestrians by location were used to estimate the impact of congestion on the frequency and cost of accidents. Estimates of the average cost per occurrence of accidents of different severity levels were used to calculate the total cost of accidents in the Garment Center in 1973.

The results of the analysis of the impact of truck traffic on accident costs are highly tentative. The major conclusion suggests that the level of truck traffic may have a positive effect on accident costs, but is less important than the level of other vehicular traffic (mainly automobiles and taxis) in explaining the frequency of accidents. The policy implication of this result is that efforts to reduce the proportion of trucks in the total traffic, without reducing the overall level of traffic congestion, would do little to reduce (and might in fact increase)accident costs. Another tentative finding suggests that the level of pedestrian activity has relatively little impact on the frequency of accidents as a whole and even on the frequency of accidents involving injuries. Conclusions suggest that the level of truck traffic may have a positive effect on accident costs, but is less important than the level of other vehicle traffic (mainly automobiles and taxis) in explaining the frequency of accidents. Another tentative finding suggests that the level of pedestrian activity has relatively little impact on the frequency of accidents as a whole and even on the frequency of accidents involving injuries.

## VII.5.2 PREVIOUS STUDIES

A number of studies have made estimates of the average costs of different types of accidents. Most such studies include the following categories of costs: property damage, treatment of injuries, value of time lost, legal and court expenses, excess damages awarded in law suits, and in the case of fatal accidents, the net present value of lost future earnings. Studies vary in their treatment of funeral costs, unreported accidents and unreported costs of reported accidents.

A paper written by P. Abramson[1] uses the results of a number of other studies to estimate the average cost per accident for different categories of accidents. His results, which include the cost factors listed above, are shown in the following table.

In applying these estimates to the problem of estimating the benefits (in reduced accident costs) of improved traffic control devices, Abramson uses the following average figures:

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[1] P. Abramson, "An Accident Evaluation Analysis," in Transportation Research Board, Traffic Accident Analysis (Transportation Research Record No. 486).

| Accident Severity | Cost per Accident |
|---|---|
| Fatal | 50,000 |
| Injury | 2,500 |
| Property Damage Only (PDO) | 500 |

To obtain estimates of the cost of accidents to apply to the Garment Center, these figures were adjusted downward somewhat, as Abramson's figures were considered to overestimate costs for several reasons. In the case of fatalities, the studies on which he based his estimates generally used a low (4 percent) discount in evaluating the net present value of lost future earnings, the largest single cost component for fatal accidents. We have used the same summary figure as does Abramson, which is somewhat less than the figures shown in Table VII-10. Secondly, while he uses different estimates of accident frequencies by type for rural and for urban areas, Abramson uses the same average cost figures for all accidents, whether urban or rural, on highway or on local streets. In general, the cost of high-speed highway accidents will be greater than that of those occurring on local streets. However, since most of the studies on which he based his estimates used data on urban accidents, his final figures are not likely to be seriously biased for our purposes.

Finally, his summary estimates for injuries and for property-damage-only accidents (PDO's) reflect the costs of intersection accidents only and include data for head-on collisions. In both cases, this raises the average cost per accident. Because we are interested in the cost of non-intersection as well as intersection accidents and because head-on accidents probably do not occur in areas characterized by one-way streets, we have made downward adjustments in these two figures. The average cost figures used for this study are therefore as follows:

| Accident Severity | Cost per Accident, 1967 | Cost per Accident, 1973 |
|---|---|---|
| Fatal | 50,000 | 66,500 |
| Injury | 2,000 | 2,660 |
| PDO | 450 | 600 |

The figures for 1973 have been inflated by the Consumer Price Index (100.0 in 1967 and 133.1 in 1973) to account for inflation.

Table VII-10:

AVERAGE 1967 COST OF ACCIDENTS BY TYPE
($ per accident)

| Accident Severity | Head-On | Rear-End | Angle | Sideswipe | Turning | Pedestrian |
|---|---|---|---|---|---|---|
| Fatal | 58,116 | 53,693 | 55,013 | 54,399 | 51,842 | 46,879 |
| Injury | 3,341 | 1,932 | 1,873 | 1,302 | 1,875 | 1,433 |
| Property Damage Only (PDO) | 595 | 310 | 405 | 246 | 321 | 0 |
| All Others | 3,500 | 700 | 900 | 400 | 700 | 5,100 |

### VII.5.3 APPLICATION OF COST ESTIMATES TO ACCIDENTS IN THE GARMENT CENTER

Using these cost averages per accident, it can be estimated that the total cost of all 1973 accidents in the Garment Center was $859,000.[1] This figure was calculated as follows:

> ($600 X 310 PDO accidents) + ($2660 X 228 accidents involving injuries) + ($66,500 X 1 fatal accidents)

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[1] This estimate applies to the area bounded by 6th Avenue and 8th Avenue and between 35th Street and 40th Street. This geographic definition was used throughout this analysis because complete traffic, pedestrian and accident data were available only for this area.

## VII.5.4 ESTIMATE OF THE COST OF ACCIDENTS ATTRIBUTABLE TO TRUCK TRAFFIC IN THE GARMENT CENTER

In order to estimate the savings in accident costs that might be expected if truck traffic were reduced in the Garment Center, it is necessary to analyze the effects of changes in truck activity on the frequency and severity of accidents. A number of factors might affect the frequency with which accidents occur, for instance, congestion, law enforcement, street width and conditions, the mix of turning versus through traffic at intersections, and the presence or absence of traffic control devices and one-way streets. Congestion has a number of dimensions that might affect the cost of accidents. It would be expected that more traffic (truck, auto or pedestrian), other things being equal, would result in more accidents. Indeed, over some range it would be expected to see increasing returns to scale, i.e. if traffic doubled, worsening congestion, the number of accidents would more than double. On the other hand, the effect of congestion in reducing average speeds may reduce the number of fatal as opposed to injury accidents or the number of injury as opposed to PDO (property-damage-only) accidents. A reduction in average severity might then offset somewhat an increase in the frequency of accidents. It was also expected that the mix as well as the level of traffic would affect accidents. An increase in truck activity might have a very different impact on accident costs than a similar increase in automobile or taxi traffic.

In an attempt to measure the impact of different factors on accident frequency, a cross-section regression analysis was performed using data on accidents and traffic in the Garment Center. The unit of observation was a single intersection. Variables other than vehicle and pedestrian traffic were not included in this analysis. Factors, such as the width and condition of streets or the nature of traffic control measures, vary at different intersections and may have an important impact on the frequency of accidents. The fact that these conditions were not considered explicitly reduced the explanatory power of our results.

For each intersection in the area between 6th Avenue and Eighth Avenue and between 35th and 41st Streets, estimates were compiled of typical weekday traffic levels by type of vehicle (trucks and all other)[1] from the 1973 summer classification count. Relative pedestrian levels at each intersection were measured using data from the six minute lunchtime counts

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[1] At first, an attempt was made to disaggregate traffic data to test the effects of turning vs. through vehicles and of north-south bound vs. east-west bound vehicles separately. However, there were insufficient observations on accident frequencies to permit statistically significant results using a large number of explanatory variables. Increasing the number of intersections studied or using accident data for a number of years might permit the use of more disaggregated explanatory variables. Increasing the number of observations would also permit the consideration of other variables such as street conditions and traffic control measures.

which were performed at most intersections in the District. A count of accidents by type for each intersection ( and the immediately adjacent street segments) was obtained from a New York City Police Department listing of all 1973 accidents in the area. Two regressions were run on the cross-section of 26 intersections. The results are as follows.

a) Total number of accidents (TA) as a function of truck traffic (TT), other vehicle traffic (OT) and pedestrian traffic (PED)

$$\log(TA) = \underset{(-3.0)}{-14.9} + \underset{(0.56)}{.413} * \log(TT) + \underset{(2.77)}{1.37} * \log(OT)$$

$$+ \underset{(.093)}{.027} * \log(PED)$$

$R^2$ (corrected) $= .53$; D.f. $= 22$

Only the coefficient of other (non-truck) vehicle traffic is statistically significant in this regression. The three explanatory variables included together explain only 53 percent of the variability in the total number of accidents across intersections. While the results of this regression are not highly significant, it is still possible to make a number of interesting inferences.

Firstly, the level of pedestrian activity seems to have very little impact on the frequency of total accidents.[1]

Secondly, the level of other vehicle traffic (automobile, taxis and buses) isa more significant factor in explaining accident frequency than is the level of truck traffic. This is somewhat surprising, as one might expect heavy truck traffic to cause greater general congestion than other traffic and therefore to be associated with higher accident rates.

There are two possible explanations for such a result. Firstly, it is well-known in the field of accident analysis that truck drivers are more highly trained and careful as drivers than the average automobile driver, and therefore might be expected to cause fewer accidents per vehicle. A second possible explanation is that the presence of trucks may decrease average speeds more than do an equivalent number of automobiles and taxis. If high vehicle speeds (as opposed to number of vehicles per se) are an important cause of accidents, then it might be expected to find that an additional truck has less impact on accident frequency than does an additional car or taxi. The factors determining average speed (street width and conditions, traffic controls and congestion), as well as the effect of speed on accident occurance, should be tested explicitly in any future analysis.

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[1] No separate analysis was made of injury accidents involving pedestrians specifically. It is likely that the level of pedestrian traffic would have a somewhat larger impact in the frequency of this subcategory of accidents.

Finally, as was anticipated, the combined coefficients show increasing returns with increasing levels of traffic as a whole.[1] According to these results, a given percentage

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[1] Because of the form in which this equation was specified, the existence of increasing returns to scale can be determined by summing the coefficents of the three variables. The equation used to test the relationship between accidents and traffic levels is of the following form:

$$TA=a*TT^{b1} * OT^{b2} * PED^{b3}$$

This specification was chosen because we would expect the effect of increasing traffic levels of the three types to be multiplicative (as congestion increases) rather than simply additive. In this form, the exponents $b_1$, $b_2$, and $b_3$ are measures of elasticities -- the percentage change in TA that could be expected to result from a one percent change in traffic levels. If the sum of all coefficients is greater than one, we can conclude that a 1 percent change in traffic will be associated with a greater than 1 percent change in the number of accidents.

(Footnote continued on following page.)

increase in total vehicle traffic (assuming a reasonably constant traffic mix) would result in a more than proportional increase in the number of accidents.

b) Number of accidents involving injuries (IA) as a function of total truck traffic (TT), other vehicle traffic (OT) and pedestrian traffic (PED);

In order to consider the effect of truck traffic on accident costs as well as on accident frequency, a second equation was estimated:

$$\log (IA) \underset{(-3.16)}{-24.0} + \underset{(0.71)}{.81} * \log (TT) + \underset{(1.97)}{1.50} * \log (OT)$$

$$+\underset{(1.11)}{.49} * \log (PED)$$

$R^2$ (corrected) = .359; D.f. =22

The purpose of this equation is to determine whether truck traffic has a greater or a lesser impact on the most severe (costly) category of accidents. The best estimate of the truck coefficient suggests that the level of truck traffic is somewhat more important in explaining the frequency of injury accidents than in the previous regression.

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(Footnote continued)

In order to estimate the coefficients, this equation was converted to a linear form by expressing all variables in logged form, i.e.:

$$\log (TA) = \log a + b_1 \log (TT) + b_2 \log (OT) + b_3 \log (PED)$$

As might be expected, the level of pedestrian activity becomes a more important explanatory variable when injury accidents (which include injuries to pedestrians ) are considered separately -- the coefficent for pedestrian traffic is higher and the estimate is more significant statistically.

### VII.5.5 CONCLUSIONS

The results of the regression analysis do not permit a strong conclusion about the role of truck traffic in explaining accidents costs in the Garment Center. Future analysis of factors affecting accident costs should explicitly include information on street conditions, on street widths, on lighting and on traffic control measures. Once these factors are accounted for, an improved estimate of the impact of different types and levels of traffic on accident costs may be possible.

Tentative conclusions emerging from this analysis would suggest that congestion caused by automobiles and taxis has a major effect on the frequency and severity of accidents. Trucks seem to be less important. It has been hypothesized that trucks have a greater impact in reducing average speeds than do an equivalent number of automobiles and taxis and that truck drivers are more careful in general than drivers of other vehicles.

Finally, it would appear that the number of pedestrians crossing streets has relatively little impact on the frequency of accidents as a whole, though some increase in the sub-category, injury accidents, might be expected if pedestrian traffic increased substantially.

The tentative results of this analysis suggest that the major portion of the 1973 cost of accidents in the Garment Center ($859,000) is attributable to automobile and taxi traffic. This suggests that if truck traffic were reduced only to be replaced by other vehicles the number of and perhaps the severity of accidents might increase. It would be interesting to compare the experience of the Garment Center with another section of Manhattan with similar street conditions, etc., but with lower levels of truck traffic to test this result.

# APPENDIX A

## METHOD USED TO CONSTRUCT A CO PROFILE FOR THE GARMENT CENTER

1. For each air testing site in the Garment Center, the DAR summarized readings of carbon monoxide levels to show peak one-hour and eight-hour averages. A frequency distribution was constructed for each site using the observations for eight-hour averages according to the following format:

| Range of eight-hour average CO readings observed (parts of per million ) | Number of tests days in which the peak eight-hour average fell within the specified range |
|---|---|
| 9-11.5 | (Frequency distribution of readings for industrial sites) |
| 11.5-12 | |
| 12-18 | |
| 18-24 | |
| 24-35 | |
| 35-39 | |

The CO ranges were chosen so as to facilitate comparison with Ahern's results.

2. This frequency distribution was converted into estimates of the percentage of time CO levels in the specified ranges were observed. This was done by dividing the number of days in each interval by the total number of days for which eight-hour averages were compiled at each site. If, for instance, tests were made and eight-hour averages calculated for five days at Site A, and the results were 15.0, 14.0, 10.5, 24.3 and 8.5, the following percentages would be calculated:

| Range of Eight-Hour Averages (ppm) | Number of Observations in Specified Range | Percentage of Time Estimated |
|---|---|---|
| 9-11.5 | 1 | 20% |
| 11.5-12 | 0 | 0 |
| 12-18 | 2 | 40% |
| 18-24 | 0 | 0 |
| 24-35 | 1 | 20% |
| 35-39 | 0 | 0 |
| Total Exceeding 9ppm | 4 | 80% |

3. These percentage figures were then converted to estimates of the hours per year during which the specified average ranges prevailed. The percentages were multiplied by 250, the average number of work days in a year and then by 8, the number of hours during which the specified average CO levels prevailed.

This approach probably understates the concentration levels in the Garment Center. First, it assumes that peak eight-hour average levels were always below 9.0 ppm on weekends. This assumption was made, first, because no CO readings were made on weekends and therefore precise data were not available and second, because the estimates of exposure (numbers of persons) used in this study are based on the typical weekday daytime experience. In fact, however, data collected for a site on the periphery of the Garment Center (8th Avenue between 41st and 42nd) suggest that levels of 9ppm are often exceeded on weekends in this area. Third, this approach assumes that only during the eight hours included in the peak eight-hour period were CO readings in the specified ranges observed. Again, this is not generally the case. Hours other than those in the eight-hour peak average often have readings almost as high as the peak hours. These estimates of the number of hours in which the Federal standard of 9 ppm was exceeded at the different sites are probably understated.

Finally, the results for the different sites were combined to arrive at an average profile for the Garment Center as a whole. These results are presented in Table A-1. Again, because we are ultimately interested in evaluating the impact of garment industry related truck traffic on air quality, only air testing sites located in or near the core of the Garment Center were included.

In light of the conservative assumptions made in constructing these estimates, the results are dramatic. A maximum of 2,000 hours could be estimated for any location (8 hours per day times 250 workdays per year). For all but two of the eight locations, average

CO levels were predicted to exceed 9 ppm for the entire 2,000 possible hours, reflecting the fact that for those locations, eight-hour averages above 9 ppm were observed on every day for which tests were conducted. Indeed, in most cases, the averages substantially exceeded 9 ppm. The largest number of average readings fell in the range 12 to 18 ppm.

As air quality tests were conducted at most sites for five days only, it is difficult to know whether these high concentration levels are in fact typical throughout the year. Nonetheless, the data would seem to support a conclusion that CO concentration levels are significantly worse than those assumed by Ahern for a representative central city.

# VIII. METHODOLOGY

## VIII.1 INTRODUCTION

The stated goal of the Study is to determine and evaluate practical ways of improving the movement of goods and people in New York City's Garment Center. The Phase I effort concentrated on the collection of data, analysis of the goods movement problem (its characteristics and its magnitude) and the implementation of a number of short-range improvements.

The Study became involved in a massive data collection effort. Although a number of other studies have been conducted in the Garment Center (see Chapter IX), these studies could not provide the up-to-date and detailed data that this Study required. This chapter will present some of the tools developed during the course of the Garment Center Study for the collection of data. In addition, several aspects of the methodology used for the analysis of these data will be described.

## VIII.2 DATA COLLECTION

The collection of data was an important element of the entire Study. The information provided the basis for the analysis of the Garment Center's problems and helped to identify a number of potential solutions to these problems. The Study sought to develop a broad perspective on the nature of the activities in the Garment Center. In order to do this data were collected from the many different sectors that are active in the Area. This was done so as to more accurately reflect the public and private sector's roles in this complex urban area. The Study developed a number of survey forms and questionnaires to facilitate the collection of the needed data.

The survey forms that were developed were field tested for a brief period during the Fall of 1973. After modifications were made to improve the effectiveness of these forms they were used during the November 1973 and December 1973 data collection efforts. Follow-up surveys were also conducted during March of 1974. The Study relied heavily upon student surveyors to administer these forms. The students proved to be much more effective in the field after they had had an opportunity to familiarize themselves with each of the forms. In addition, by letting each student use only two or three forms, confusion was minimized. The survey forms were used for the collection of district-wide and block segment traffic data, street activity data, curbspace utilization data and inter- and intra-building goods movement activity data. The survey forms appearing at the end of this chapter are:

a. Form 1A/B: Vehcile Classification Counts
7:30 AM - 12:30 PM, 12:30 PM - 5:30 PM

b. Form 2 : Parking Duration Field Sheet and Computer Input Form

c. Form 3: Commercial Vehicle Circulation

d. Form 4: Pedestrian and Handcart Observations

e. Form 5: Curbside Vehicle Observations

f. Form 6: Handcart Activity Observations

g. Form 7 a/b/c: Elevator Observations

h. Form 8: Parking Proximity Study

i. Form 9: Duration of Inbuilding Time

Questionnaires were developed to assist in the gathering of information on the economic structure of the Garment Center. Separate surveys were developed for apparel manufacturers/jobbers, apparel contractors and truckers. Two types of apparel industry questionnaires were used because of the difference in characteristics between the manufacturer/jobber and the contractor. The apparel industry questionnaires were primarily administered by TAD personnel. This was due in part to the difficulty inexperienced surveyors had in obtaining the desired information. Although the use of only a few TAD personnel did reduce the number of possible interviews, the quality of the data was high.

The trucker questionnaire was administered through the mails and during face-to-face interviews. Face-to-face interviews were necessary due to the low number of responses to mail surveys. Again the trade-off was for a small number of accurate and complete sample questionnaires, rather than a large number of incomplete responses. The questionnaire forms appear at the end of this chapter.

The data collection effort using both survey forms and questionnaires proved to be very effective if a certain amount of care was exercised during their administration. The most important factors were:

- Pre-testing of the forms and the questionnaires to reduce their ambiguity and facilitate their use.
- Familiarization sessions with each of the surveyors to acquaint them with the use of the forms.
- Simulation sessions to determine the best method for using the questionnaires.
- Meetings with industry and trucking associations to identify potential samples.

## VIII.3 DATA ANALYSIS

### VIII.3.1 Background and Scope of Work

The analysis of the data permitted the drawing of cogent conclusions about the situation in the Garment Center. The analysis led to the identification of the problems and points of conflict in the Area. Among the results of the analysis was the establishment of the cost of the various parts of the goods movement system. Also a determination of how the complex goods movement system operates was made, the way it interacts with the surrounding environment as well as how each element relates to each other.

Based upon the data collected the following tasks were completed:

1. The development of a micro- and macro-scale model describing the flow of goods into, out of and within the Garment Center. (see Chapter V)
2. An evaluation of the public cost of air pollution in the Garment Center and the development of a picture of air quality conditions. (see Chapter VII)
3. An evalutation of the total cost of the goods movement system to manufacturers, jobbers and contractors. The evaluation considered the direct and indirect costs. (see Chapter VI)
4. Analysis of the underlying structure of the apparel industry and how the goods movement systems serves it. (see Chapter II)
5. An evaluation of the transportation activies in the Garment Center, including vehicles, pedestrians and handcarts. (see Chapter IV)
6. An analysis of the type of land uses and employment patterns that have shaped the area in the past and will continue to in the future. (see Chapter III)

Described below are the methodologies used for the analysis of elevator observation data and the development of the air quality profile for the Garment Center. The results from these analyses were used, but not described elsewhere.

### VIII.3.2 Elevator Observation Data Analysis

A significant segment of the goods movement system within the Garment Center is vertical use of elevators as a means of transporting goods between the shipper/receiver in multi-story buildings and street level. The four sample blocks in the Garment Center were selected for observation during the November-December 1973 street activity measurement surveys. The two months represent a less than peak period. Land use and economic data for the buildings on the sample blocks were examined in order that sample buildings represent a wide range of building, apparel manufacturing, elevator and employment characteristics.

Twenty-one buildings were observed in detail with at least five buildings per sample block. Surveyors rode the elevators continuously, averaging 3.6 hours per building during morning, noon and afternoon periods. Data on stop times, travel times, loading and unloading activity, commodity carried and the queue length at each stop were recorded. In addition elevator capacities, dimensions and speeds were also observed. Eight of the original buildings were re-observed in March, a peak period.

Two basic methods were utilized to develop freight elevator operating characteristics. The first compiled these four basic descriptive statistics:

1. Comparison of morning, noon and afternoon activity. The data were analyzed to determine variations in activity by time of day. (Noon defined as 11 AM to 2 PM)
2. The ratio of intrabuilding loaded handcart trips to total number of loaded handcart trips and the percentage of empty elevator trip segments. This provided an estimate of intrabuilding elevator usage.
3. The ratio of one way trip distance to building height.
4. A comparison of November and March data to determine if any seasonal patterns existed.

The second approach related the descriptive statistic (dependent variable) to background land use and economic data (independent variable). A stepwise multiple linear regression analysis was performed for each descriptive statistic using a common set of land use and economic data for each building. The independent variable that were selected because of their importance included:

a. Number of floors served

b. Number of freight elevators in use

c. Elevator platform area

d. Elevator door width

e. Maximum elevator travel rate

and the following ratios:

f. Floors served per elevator in use

g. Total building area per elevator in use

h. Total employees per elevator in use

i. Total number of firms per elevator in use

j. Total apparel manufacturing employees per elevator in use

k. Total apparel manufacturing firms per elevator in use

Two common sets of independent variables were used: one set contained total employment and firm data; the other contained apparel manufacturing employment and firm data.

Data Set I : a,b,c,d,e,f,g,h,i

Data Set II: a,b,c,d,e,f,g,j,k

The descriptive land use and economic data are contained in Table VIII-1. Table VIII-2 summarizes the ability of the independent variable to describe the dependent variable. The order of importance of the dependent variable , the calculated multiple correlation coefficient, the F test for analysis of variance and the average observed values are shown.

A measure of overall importance was developed giving equal weight to descriptive statistics 5 through 9 and one half weight for 1 through 4. In summary, the most important variables, in order of importance were:

1. Ratio of floors served per freight elevator
2. Total number of floors served
3. Elevator platform area
4. Apparel manufacturing employees per freight elevator

Table VIII-1 : LAND USE & ECONOMIC DATA USED FOR MULTIPLE LINEAR REGRESSION ANALYSIS

| Building Address | # of Floors Served | # of Freight Elevators in Use | Elevator Platform Area (sq. ft.) | Elevator Door Width (feet) | Maximum Rate of Travel (ft./minute) | Floors Served / Elevators in Use | Bldg. Area (sq. ft.) / Elevators in Use | Total Employees / Elevators in Use | Total Firms / Elevators in Use | Apparel* Employees / Elevators in Use | Apparel* Firms / Elevators in Use |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 203 W 35th | 23 | 2 | 42 | 4.0 | 375 | 11.5 | 91,630 | 255 | 14 | 224 | 10 |
| 212 W 35th | 16 | 1 | 45 | 5.0 | 310 | 16.0 | 80,975 | 414 | 10 | 352 | 7 |
| 224 W 35th | 17 | 2 | 27 | 3.7 | 330 | 8.5 | 76,850 | 202 | 10 | 193 | 8 |
| 253 W 35th | 16 | 2 | 49 | 4.5 | 275 | 8.0 | 80,585 | 177 | 12 | 104 | 7 |
| 251 W 35th | 16 | 2 | 49 | 4.0 | 340 | 8.0 | 54,175 | 170 | 11 | 130 | 7 |
| 1359 Broadway | 20 | 4 | 56 | 6.0 | 345 | 5.0 | 97,620 | 233 | 42 | 168 | 14 |
| 132 W 36th | 13 | 2 | 32 | 4.4 | 215 | 6.5 | 69,040 | 148 | 13 | 137 | 11 |
| 135 W 36th | 21 | 2 | 36 | 4.0 | 360 | 10.5 | 42,680 | 238 | 12 | 115 | 9 |
| 141 W 36th | 22 | 1 | 49 | 6.0 | 375 | 22.0 | 112,376 | 207 | 25 | 186 | 22 |
| 142 W 36th | 18 | 2 | 53 | 6.0 | 319 | 9.0 | 52,336 | 144 | 11 | 90 | 7 |
| 222 W 37th | 14 | 1 | 30 | 4.0 | 340 | 14.0 | 46,790 | 89 | 13 | 38 | 6 |
| 225 W 37th | 17 | 2 | 42 | 5.0 | 380 | 8.5 | 81,265 | 178 | 15 | 150 | 4 |
| 225 W 37th | 16 | 1 | 30 | 3.0 | 340 | 16.0 | 79,905 | 217 | 21 | 55 | 3 |
| 241 W 37th | 12 | 2 | 36 | 4.3 | 145 | 6.0 | 40,060 | 59 | 8 | 46 | 5 |
| 252 W 37th | 17 | 2 | 27 | 4.5 | 340 | 8.5 | 69,070 | 111 | 15 | 67 | 11 |
| 265 W 37th | 23 | 2 | 30 | 4.2 | 390 | 11.5 | 103,730 | 213 | 22 | 162 | 13 |
| 498 7th Avenue | 24 | 10 | 54 | 6.0 | 430 | 2.4 | 88,370 | 235 | 16 | 195 | 11 |
| 500 7th Avenue | 17 | 8 | 45 | 4.7 | 600 | 2.1 | 82,135 | 162 | 12 | 104 | 5 |
| 501 7th Avenue | 17 | 4 | 52 | 5.0 | 315 | 4.3 | 104,355 | 278 | 15 | 274 | 14 |
| 512 7th Avenue | 43 | 5 | 30 | 3.3 | 620 | 8.6 | 105,360 | 296 | 19 | 230 | 12 |
| 530 7th Avenue | 15 | 3 | 42 | 5.0 | 500 | 5.0 | 87,315 | 321 | 22 | 267 | 15 |

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* Classified as 2300's within SIC code.

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## Table VIII-2: RESULTS OF MULTIPLE LINEAR REGRESSION ANALYSIS

| Descriptive Statistic | Average Observed Value | Independent Data Set | Land Use and Economic Data - Ranked in Order of Importance: # of Floors Served | # of Freight Elevators in Use | Elevator Platform Area (sq. ft.) | Elevator Door Width (ft.) | Maximum Rate of Travel (fpm) | Floors Served / Freight Elevator | Building Area / Freight Elevator | Employees / Freight Elevator | Firms / Freight Elevator | Apparel Employees / Freight Elevator | Apparel Firms / Freight Elevator | Multiple Correlation Coefficient | F Test for Analysis of Variance: D. F. | F. Value | Conclusion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Observed average queue length at main floor - handcarts and individuals without handcarts | 0.68 | I & II | | 2 | 1 | | | 3 | 4 | | | | | .69 | 4, 17 | 3.85 | Acceptable at .05 level of significance |
| 2. Percent occurrence of 0 queue length at main floor - handcarts and individuals without handcarts | 66% | I & II | | 2 | 1 | | | 3 | 4 | | | | | .79 | 4, 17 | 7.04 | Acceptable at .05 level of significance |
| 3. Observed average queue length at other floor - handcarts and individuals without handcarts | 0.63 | I<br>II | 2<br>2 | | 1<br>1 | | | | 3<br>3 | | 4 | | 4 | .48<br>.44 | 4, 17<br>4, 17 | 1.24<br>1.01 | Not acceptable at .05 level of significance |
| 4. Percent occurrence of 0 queue length at other floor - handcarts and individuals without handcarts | 55% | I<br>II | 2<br>2 | 4 | 1<br>1 | | | | 4 | 3 | | 3 | | .47<br>.45 | 4, 17<br>4, 17 | 1.22<br>1.09 | Not acceptable at .05 level of significance |
| 5. Stop time at main floor in minutes | 1.72 | I<br>II | | | 3<br>3 | | | 1<br>1 | | 2 | | 2 | | .68<br>.69 | 3, 18<br>3, 18 | 5.31<br>5.51 | Acceptable at .05 level of significance |
| 6. Remainder of elevator round trip time in minutes (Total round trip time less ground floor stop time) | 2.23 | I & II | 2 | | | | 3 | 1 | | | | | | .54 | 3, 18 | 2.48 | Acceptable at .10 level of significance |
| 7. Observed number of stops and trip segments per round trip | 3.53 | I<br>II | 1<br>1 | | | | | 2<br>2 | | 3 | | 3 | | .70<br>.73 | 3, 18<br>3, 18 | 5.80<br>6.73 | Acceptable at .05 level of significance |
| 8. Percent of empty elevator trip segments | 32% | I & II | 3 | 4 | | | | 1 | 2 | | | | | .60 | 4, 17 | 2.35 | Acceptable at .10 level of significance |
| 9. Average number of handcarts on elevator as arrive at or depart from main floor | 0.71 | I<br>II | | 5<br>4 | 7<br>5 | | 1<br>2 | 4<br>3 | 2 | 3 | 6 | 1 | | .89<br>.83 | 7, 14<br>5, 16 | 7.88<br>7.08 | Acceptable at .05 level of significance |
| OVERALL RELATIVE IMPORTANCE | | | 2 | 7 | 3 | 8 | 9 | 1 | 6 | 5 | 10 | 4 | 11 | | | | |

Table VIII-3 : PREDICATIVE EQUATIONS FROM STEPWISE MULTIPLE LINEAR REGRESSION ANALYSIS

| Descriptive Statistic | Data Set | Constant | Independent Variables with Regression Coefficient |
|---|---|---|---|
| 1. Observed Average Queue Length At Main Floor – Handcarts and Individuals Without Handcarts | I and II | .374 | + (1.816E-2) (Elevator Platform Area) – (.195) (# of Freight Elevators In Use)<br>– (8.453E-2) $\left(\frac{\text{Floors Served}}{\text{Freight Elevator}}\right)$ + (1.138E-5) $\left(\frac{\text{Building Area}}{\text{Freight Elevator}}\right)$ |
| 2. Percent Occurrence of 0 Queue Length at Main Floor – Handcarts and Individuals Without Handcarts (For xx%, use .xx as input) | I and II | .715 | – (6.896E-3) (Elevator Platform Area) + (7.053E-2) (# of Freight Elevators In Use)<br>+ (3.067E-2) $\left(\frac{\text{Floors Served}}{\text{Freight Elevator}}\right)$ – (3.251E-6) $\left(\frac{\text{Building Area}}{\text{Freight Elevator}}\right)$ |
| 3. Observed Average Queue Length at Other Floor – Handcarts and Individuals Without Handcarts | I | .535 | + (2.964E-3) (Elevator Platform Area) – (7.746E-3) (# of Floors Served)<br>+ (2.987E-6) $\left(\frac{\text{Building Area}}{\text{Freight Elevator}}\right)$ – (7.040E-3) $\left(\frac{\text{Firms}}{\text{Freight Elevator}}\right)$ |
|  | II | .509 | + (3.146E-3) (Elevator Platform Area) – (7.555E-3 (# of Floors Served)<br>+ (2.562E-6) $\left(\frac{\text{Building Area}}{\text{Freight Elevator}}\right)$ – (5.534E-3) $\left(\frac{\text{Apparel Firms}}{\text{Freight Elevator}}\right)$ |
| 4. Percent Occurrence of 0 Queue Length at Other Floor – Handcarts and Individuals Without Handcarts | I | .555 | – (1.005E-3) (Elevator Platform Area) + (2.292E-3) (# of Floors Served)<br>– (1.953E-4) $\left(\frac{\text{Employees}}{\text{Freight Elevator}}\right)$ + (4.394E-7) $\left(\frac{\text{Building Area}}{\text{Freight Elevator}}\right)$ |
|  | II | .551 | – (7.556E-4) (Elevator Platform Area) + (3.038E-3) (# of Floors Served)<br>– (1.065E-4) $\left(\frac{\text{Apparel Employees}}{\text{Freight Elevator}}\right)$ – (3.989E-3) (# of Freight Elevators In Use) |

## PREDICTION EQUATIONS FROM STEPWISE MULTIPLE LINEAR REGRESSION ANALYSIS cont.

| Descriptive Statistic | Data Set | Constant | Independent Variables with Regression Coefficient |
|---|---|---|---|
| 5. Stop Time at Main Floor in Minutes | I | 2.312 | $+ (6.706E{-}2)\left(\frac{\text{Floors Served}}{\text{Freight Elevator}}\right) - (1.791E{-}3)\left(\frac{\text{Employees}}{\text{Freight Elevator}}\right) - (1.934E{-}2)$ (Elevator Platform Area) |
| | II | 2.244 | $+ (6.918E{-}2)\left(\frac{\text{Floors Served}}{\text{Freight Elevator}}\right) - (1.931E{-}3)\left(\frac{\text{Apparel Employees}}{\text{Freight Elevator}}\right)$<br>$- (1.933E{-}2)$ (Elevator Platform Area) |
| 6. Remainder of Elevator Round Trip Time in Minutes | I and II | 2.683 | $- (5.467E{-}2)\left(\frac{\text{Floors Served}}{\text{Freight Elevator}}\right) + (5.645E{-}2)$ (# of Floors Served)<br>$- (2.803E{-}3)$ (Maximum Rate of Travel) |
| 7. Observed Number of Stops and Trip Segments Per Round Trip | I | 2.147 | $+ (8.470E{-}2)\left(\frac{\text{Floors Served}}{\text{Freight Elevator}}\right) - (8.312E{-}2)$ (# of Floors Served) $+ (2.009E{-}3)\left(\frac{\text{Employees}}{\text{Freight Elevator}}\right)$ |
| | II | 2.256 | $+ (9.293E{-}2)\left(\frac{\text{Floors Served}}{\text{Freight Elevator}}\right) - (8.555E{-}2)$ (# of Floors Served) $+ (1.435E{-}3)\left(\frac{\text{Apparel Employees}}{\text{Freight Elevator}}\right)$ |
| 8. Percent of Empty Elevator Trip Segments | I and II | .353 | $+ (1.323E{-}2)\left(\frac{\text{Floors Served}}{\text{Freight Elevator}}\right) - (1.236E{-}6)\left(\frac{\text{Building Area}}{\text{Freight Elevator}}\right) - (4.451E{-}3)$ (# of Floors Served)<br>$+ (1.591E{-}2)$ (# of Freight Elevators in Use) |
| 9. Average Number of Handcarts on Elevator as Arrive At or Depart From Main Floor | I | .840 | $- (1.122E{-}3)$ (Maximum Rate of Travel) $+ (1.225E{-}5)\left(\frac{\text{Building Area}}{\text{Freight Elevator}}\right) - (1.918E{-}3)\left(\frac{\text{Employees}}{\text{Freight Elevator}}\right)$<br>$- (6.321E{-}2)\left(\frac{\text{Floors Served}}{\text{Freight Elevator}}\right) - (.120)$ (# of Freight Elevators in Use) $+ (2.234E{-}2)\left(\frac{\text{Firms}}{\text{Freight Elevator}}\right)$<br>$+ (8.606E{-}3)$ (Elevator Platform Area) |
| | II | .925 | $+ (4.004E{-}2)\left(\frac{\text{Apparel Employees}}{\text{Freight Elevator}}\right) - (5.420E{-}4)$ (Maximum Rate of Travel)<br>$- (4.726E{-}2)\left(\frac{\text{Floors Served}}{\text{Freight Elevator}}\right) - (.127)$ (# of Freight Elevators In Use) $+ (8.443E{-}3)$ (Elevator Platform Area) |

5. Total employees per freight elevator
6. Building area per freight elevator

The predicative equations that resulted from the stepwise multiple linear regression analysis of the data are shown in Table VIII-3.

### VIII.3.3 Analysis of Environmental Data

The methodology used by the Bureau of Motor Vehicle Pollution Control, Department of Air Resources for the analysis of carbon monoxide emissions follows the Federal recommendations as presented in the U.S. Environmental Protection Agency publication, "Interim Guidelines for Motor Vehicle Emissions Estimations - October 1974". In order to discuss this approach, the following terms are defined :

1. Light Duty Vehicle: a motor vehicle used primarily for property transport, 6,000 pounds gross vehicle weight (GVW) or less, with a capacity for 12 people or less.
2. Heavy Duty Vehicle: a motor vehicle used for property transport, more than 6,000 pounds GVW.
3. 1975 Federal Test Procedure: motor vehicle emission test from the Federal Règister, July 2, 1971.
4. Deterioration: ratio of the pollutant (p) exhaust factor at x miles to the p exhaust factor at 4,000 miles.
5. Model Year Mix: distribution of vehicles registered by model year, expressed as a fraction of the total.
6. Speed Adjustment Factor: the ratio of the p exhaust emission factor at speed x to the p exhaust emission factor as determined by the 1975 Federal Test Procedure (19.6 mph).

The calculation of emissions factors for carbon monoxide from light and heavy duty vehicle exhausts is based on the formula:

$$e_{np} = \sum_{i=n-12}^{n+1} c_{ip}\, d_{ipn}\, m_{in}\, s_{ip}$$

$e_{np}$ = emission factor in grams per vehicle mile for calendar year n and pollutant p.

$c_{ip}$ = 1975 Federal Test Procedure emission rate for pollutant p (grams/mile) for the ith model year, at low mileage.

$d_{ipn}$ = controlled vehicle pollutant p emission deterioration factor for the ith model year, calendar year n (based on the vehicle model year distribution).

$s_{ip}$ = weighted speed adjustment factor for exhaust emissions for pollutant p for ith model year vehicles.

The emissions factors for light and heavy duty vehicles were calculated separately. For the light duty vehicles the emissions rates shown in Table VIII-4 were used. The deterioration factor was derived from Table VIII-5. The factor is based on the mix of vehicles by age. This mix was determined from the data collected during the parking duration and vehicle circulation surveys. From these data information such as vehicle age and weight were obtained and the appropriate deterioration factors were developed. These data on the mix of vehicles by age and type were used with the data in Table VIII-6 to determine an accurate weighted annual mileage factor.

## Table VIII-4: LIGHT DUTY VEHICLE EXHAUST EMISSION FACTORS FOR LOW ALTITUDE CITIES[a]

| | Exhaust emission factors at low mileage[b] | | | | | |
|---|---|---|---|---|---|---|
| | Carbon monoxide | | Exhaust hydrocarbons | | Nitrogen oxides | |
| Model year | g/mi | g/km | g/mi | g/km | g/mi | g/km |
| Pre-1968 | 87 | 54 | 8.8 | 5.5 | 3.6 | 2.2 |
| 1968 | 46 | 29 | 4.5 | 2.8 | 4.3 | 2.7 |
| 1969 | 39 | 24 | 4.4 | 2.7 | 5.5 | 3.4 |
| 1970 | 36 | 22 | 3.6 | 2.2 | 5.1 | 3.2 |
| 1971 | 34 | 21 | 2.9 | 1.8 | 4.8 | 3.0 |
| 1972[c] | 19 | 12 | 2.7 | 1.7 | 4.8 | 3.0 |
| 1973-74[c] | 19 | 12 | 2.7 | 1.7 | 2.3 | 1.4 |
| 1975[d] | 12.5 | 7.8 | 1.3 | 0.81 | 2.2 | 1.4 |
| 1976 and later | 1.8 | 1.1 | 0.23 | 0.14 | 0.31 | 0.19 |

[a] Excluding California.

[b] References 4, 8-11. It should be noted that pre-1968 results are not at low mileage but are arithmetic means from tests of a random sample of vehicles. There is no reason to present low-mileage emission rates for these vehicles since they are not subject to exhaust control device deterioration.

[c] Estimates based on the relationship of low-mileage emissions to standards for 1971 and earlier controlled vehicles.

[d] Based on EPA low-mileage estimates for the 1975 interim standards.

## Table VIII-5 : CARBON MONOXIDE DETERIORATION FACTORS (d) FOR LIGHT DUTY GASOLINE POWERED VEHICLES

| Model year | Vehicle age,[a] years | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 and older |
| 1967 and earlier | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1968 | 1.24 | 1.35 | 1.41 | 1.47 | 1.53 | 1.58 | 1.63 | 1.67 | 1.72 |
| 1969 | 1.42 | 1.53 | 1.59 | 1.63 | 1.68 | 1.71 | 1.75 | 1.79 | 1.82 |
| 1970 through 1974[b] | 1.18 | 1.32 | 1.38 | 1.40 | 1.44 | 1.47 | 1.50 | 1.51 | 1.56 |
| 1975[c] | 1.04 | 1.30 | 1.36 | 1.43 | 1.44 | 1.49 | 1.56 | 1.63 | 1.69 |
| 1976 and later | 1.34 | 1.77 | 2.14 | 2.42 | 2.73 | 2.99 | 3.26 | 3.48 | 3.77 |

[a] "0"-year-old vehicles have a deterioration factor of 1.00.

[b] Based on test results for 1970 model year vehicles.

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## Table VIII-6 : SAMPLE CALCULATION OF WEIGHTED ANNUAL TRAVEL FOR LIGHT DUTY VEHICLES

| Age, years | Nationwide fraction of vehicles in use on Dec. 31 (a) | Average miles driven (b) | a x b | m[a] |
|---|---|---|---|---|
| 0[b] | 0.038 | 3,600[c] | 137 | 0.013 |
| 1 | 0.068 | 11,900[c] | 809 | 0.075 |
| 2 | 0.117 | 16,100 | 1,880 | 0.174 |
| 3 | 0.111 | 13,200 | 1,465 | 0.135 |
| 4 | 0.098 | 11,400 | 1,120 | 0.103 |
| 5 | 0.106 | 11,700 | 1,240 | 0.115 |
| 6 | 0.105 | 10,000 | 1,050 | 0.097 |
| 7 | 0.087 | 10,300 | 896 | 0.083 |
| 8 | 0.076 | 8,600 | 654 | 0.060 |
| 9 | 0.059 | 10,900 | 643 | 0.059 |
| 10 | 0.036 | 8,000 | 288 | 0.027 |
| 11 | 0.029 | 6,500 | 188 | 0.017 |
| 12 | 0.016 | 6,500 | 104 | 0.010 |
| 13 and older | 0.054 | 6,500 | 351 | 0.032 |

[a] $m = \frac{a \times b}{\sum a \times b}$

[b] "0" refers to next year's models introduced in the fall.

[c] This number reflects the fact that some vehicles in this age category have been on the road less than 12 months.

The speed adjustment factor was calculated using the formula:

$$s_{im} = \sum_{j=1}^{n} f_{jm} v_j$$

$s_{im}$ = weighted speed adjustment factor for exhaust emission of pollutant p for the ith model year during calendar year m.

$f_{jm}$ = the fraction of the total vehicle miles traveled at speed j during calendar year m.

$v_j$ = vehicular average speed correction factor for average speed j (Figure VIII-1).

The calculation of the heavy duty gasoline vehicle exhaust emission factor used the same approach as the light duty vehicle calculations. Table VIII-7 show the emission factors. A deterioration factor of 1.0 was used for all heavy duty vehicles, regardless of model year. The weighted annual mileage was determined from the mix of vehicle ages and the data in Table VIII-8. The speed adjustment factor was calculated for heavy duty trucks exactly as for light duty trucks.

Once again it should be noted that the curbside parking and vehicle circulation surveys provided the bulk of the commercial vehicle license plates. Checks on these license plates were required to develop a profile by weight, age and vehicle type (van, 2 axle truck or 3 axle truck) of Garment Center vehicles. The speed and delay results were used to develop speed correction factors. Data on private automobile

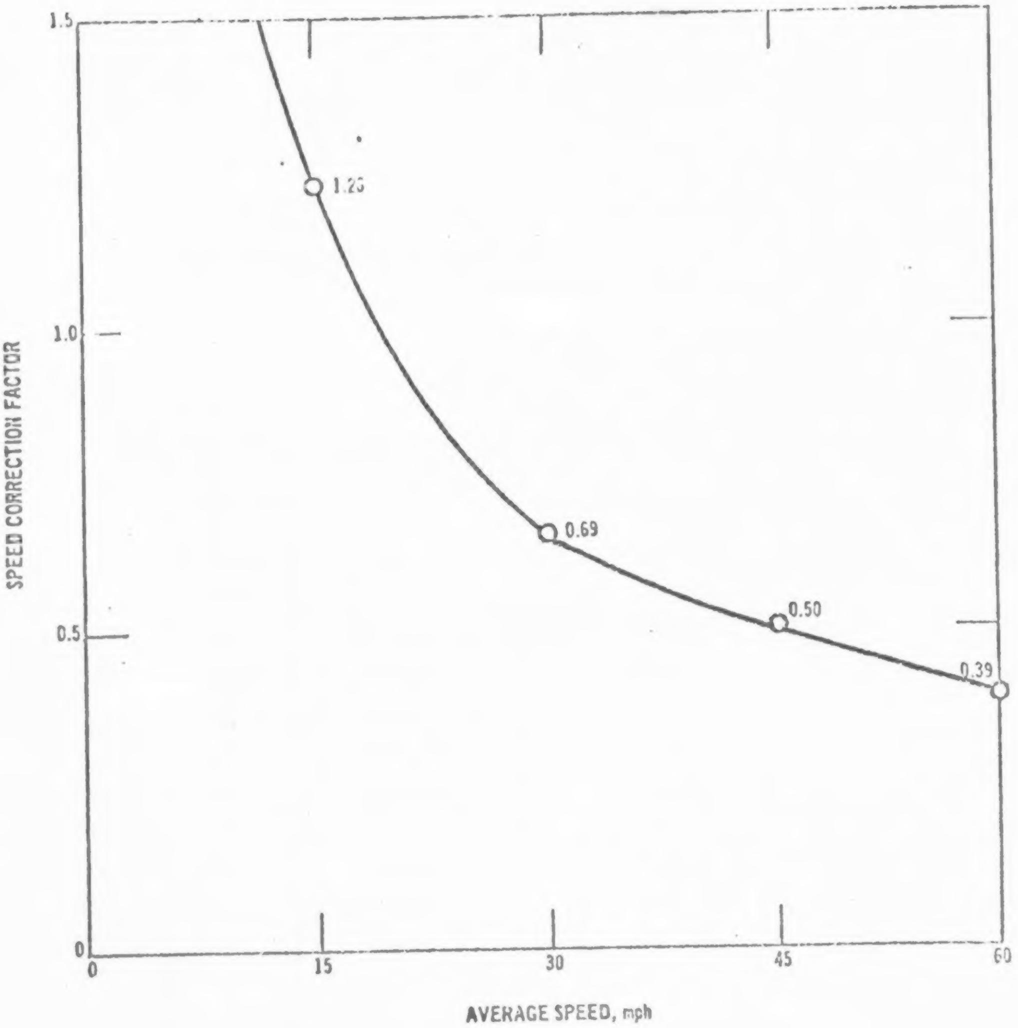

Figure VIII-1 : AVERAGE SPEED CORRECTION FACTOR FOR ALL MODEL YEARS, CARBON MONOXIDE

## Table VIII-7 : HEAVY DUTY GASOLINE POWERED VEHICLE EXHAUST EMISSION FACTORS

| Model year | Carbon monoxide | | Exhaust hydrocarbons | | Nitrogen oxide | |
|---|---|---|---|---|---|---|
| | g/mi | g/km | g/mi | g/km | g/mi | g/km |
| Pre-1970 | 140 | 87 | 17 | 11 | 9.4 | 5.8 |
| 1970 through 1973 | 130 | 81 | 16 | 9.9 | 9.2 | 5.7 |
| 1974 and later | 130 | 81 | 13 | 7.9 | 9.2 | 5.7 |

## Table VIII-8 : SAMPLE CALCULATION OF WEIGHTED ANNUAL TRAVEL BY HEAVY DUTY VEHICLES

| Age, years | Nationwide fraction of vehicles in use on Dec. 31 (a) | Annual miles driven (b) | a x b | $m^a$ |
|---|---|---|---|---|
| 0 | 0.011 | 3,500 | 38 | 0.003 |
| 1 | 0.090 | 11,700 | 1,050 | 0.095 |
| 2 | 0.105 | 17,200 | 1,810 | 0.164 |
| 3 | 0.085 | 15,800 | 1,340 | 0.121 |
| 4 | 0.080 | 15,800 | 1,260 | 0.114 |
| 5 | 0.083 | 13,000 | 1,080 | 0.097 |
| 6 | 0.075 | 13,000 | 975 | 0.088 |
| 7 | 0.064 | 11,000 | 704 | 0.064 |
| 8 | 0.054 | 11,000 | 594 | 0.054 |
| 9 | 0.045 | 9,000 | 405 | 0.036 |
| 10 | 0.034 | 9,000 | 306 | 0.028 |
| 11 | 0.036 | 5,500 | 198 | 0.018 |
| 12 | 0.031 | 5,500 | 170 | 0.015 |
| 13 and older | 0.207 | 5,500 | 1,138 | 0.103 |

$$^{a}m = \frac{a \times b}{\sum a \times b}$$

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and taxi age and weight profiles were not actively sought by the Garment Center Study. These data for the determination of the automobile and taxi characteristics came from the Department of Air Resources' own files. The calculations produced the following weighted emissions factors for carbon monoxide in emissions per mile.

WEIGHTED CO EMISSIONS FACTORS
(Emissions per Mile)

| Vehicle Type | Dec. 31, 1973 | Dec. 31, 1974* |
|---|---|---|
| Automobiles | 51.0 | 34.9 |
| Taxis | 38.2 | 36.2 |
| Trucks | 148.4 | 145.8 |
| Buses | 34.6 | 34.3 |

* vehicle turnover strategy only

# MANHATTAN GARMENT CENTER
# URBAN GOODS MOVEMENT STUDY

## Field Survey Forms

EDWARDS AND KELCEY

NEW YORK CITY
TRANSPORTATION ADMINISTRATION
MANHATTAN GARMENT CENTER URBAN GOODS MOVEMENT STUDY
VEHICLE CLASSIFICATION
(FORM 1B)

DAY:
DATE:

WEATHER:
LOCATION:

OBSERVER:

| TIME | VEHICLES | | | | | | HANDCARTS | |
|---|---|---|---|---|---|---|---|---|
| PERIOD | AUTOS | TAXIS | VANS | INT. TRUCKS | HVY. TRUCKS | BUSES | IN | OUT |
| 12:30-12:45 | | | | | | | | |
| 12:45-1:00 | | | | | | | | |
| 1:00-1:15 | | | | | | | | |
| 1:15-1:30 | | | | | | | | |
| 1:30-1:45 | | | | | | | | |
| 1:45-2:00 | | | | | | | | |
| 2:00-2:15 | | | | | | | | |
| 2:15-2:30 | | | | | | | | |
| 2:30-2:45 | | | | | | | | |
| 2:45-3:00 | | | | | | | | |
| 3:00-3:15 | | | | | | | | |
| 3:15-3:30 | | | | | | | | |
| 3:30-3:45 | | | | | | | | |
| 3:45-4:00 | | | | | | | | |
| 4:00-4:15 | | | | | | | | |
| 4:15-4:30 | | | | | | | | |
| 4:30-4:45 | | | | | | | | |
| 4:45-5:00 | | | | | | | | |
| 5:00-5:15 | | | | | | | | |
| 5:15-5:30 | | | | | | | | |
| SUB. TOTAL | | | | | | | | |
| TOTAL | | | | | | | | |

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EDWARDS AND KELCEY

NEW YORK CITY
TRANSPORTATION ADMINISTRATION
MANHATTAN GARMENT CENTER URBAN GOODS MOVEMENT STUDY
VEHICLE CLASSIFICATION
(FORM 1A)

DAY:
DATE:

WEATHER:
LOCATION:

| TIME | VEHICLES | | | | | | HANDCARTS | |
|---|---|---|---|---|---|---|---|---|
| PERIOD | AUTOS | TAXIS | VANS | INT. TRUCKS | HVY. TRUCKS | BUSES | IN | OUT |
| 7:30-7:45 | | | | | | | | |
| 7:45-8:00 | | | | | | | | |
| 8:00-8:15 | | | | | | | | |
| 8:15-8:30 | | | | | | | | |
| 8:30-8:45 | | | | | | | | |
| 8:45-9:00 | | | | | | | | |
| 9:00-9:15 | | | | | | | | |
| 9:15-9:30 | | | | | | | | |
| 9:30-9:45 | | | | | | | | |
| 9:45-10:00 | | | | | | | | |
| 10:00-10:15 | | | | | | | | |
| 10:15-10:30 | | | | | | | | |
| 10:30-10:45 | | | | | | | | |
| 10:45-11:00 | | | | | | | | |
| 11:00-11:15 | | | | | | | | |
| 11:15-11:30 | | | | | | | | |
| 11:30-11:45 | | | | | | | | |
| 11:45-12:00 | | | | | | | | |
| 12:00-12:15 | | | | | | | | |
| 12:15-12:30 | | | | | | | | |
| SUB. TOTAL | | | | | | | | |
| TOTAL | | | | | | | | |

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## INSTRUCTIONS FOR VEHICLE CLASSIFICATION

## FORM 1

Classification Period: Continuous from 7:30 A.M. to 5:30 P.M. with two 20 minute breaks in the morning and afternoon periods.

Observers' Duties:

1. Count all vehicles and handcarts crossing predetermined screen line, using a counting board.
2. At the end of every 15-minute period, record on Form 1 the cumulative volume of each vehicle category.

   Do not reset the counting board to zero.
3. Do not leave the counting station before the relief man arrives or allowed to do so by the supervisor.
4. Note that the morning counts are recorded on Form 1a and the afternoon counts on Form 1b.
5. Write your name on the line marked "Observer".

### VEHICLE TYPES

1. **Autos** - All passenger vehicles including station wagons, jeeps (exclude taxis)
2. **Taxis** - All taxis and limousines
3. **Vans** - Small trucks, 2 axles, 4 tires, including pickups
4. **Int. Trucks** - Intermediate trucks with 2 axles, 6 tires
5. **Hvy. Trucks** - All trucks with 3 or more axles, single or double units
6. **Buses** - All full size buses (micro buses and classified as autos)
7. **Handcarts IN** - entering the study block

   OUT - exiting from the study block

## INSTRUCTIONS FOR PARKING DURATION SURVEY

### FORM 2

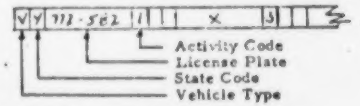
**Survey Period:** 7:30 A.M. to 5:30 P.M. in 20-minute tours.

Write your name on the line marked "Observer".

**First Tour:** Record the vehicle type, state code and complete license plate characters. Also note the general loading/unloading activity level around the truck.

**Subsequent Tours:** For each space, compare the vehicle type and license plate information with the previous tour. If there is a new vehicle in a space, record the same data items as for the first tour. If the vehicle has been observed in the space before, mark an "X" for license plate and indicate only the activity level code.

**Example:**



The first four columns are used to identify the space.

__BLOCK:__ Refers to the specificpart of the study block - 1N, 2S, etc.

__SPACE NO.:__ Numbered for each half block and refers to the sequence of 35' parking spaces. (Numbered 01, 02, 03 ...). A double parked vehicle is placed on the next available line and the adjacent space number recorded for it's space number. If there are two autos in one 35' space, the first auto is recorded normally and the second auto recorded on the next available line with the same space number repeated.

__CARD NO.:__ Not Used

__NP CODE:__ No parking code. Use R for restricted parking such as fire hydrants, curbcuts, etc., and D for double parking.

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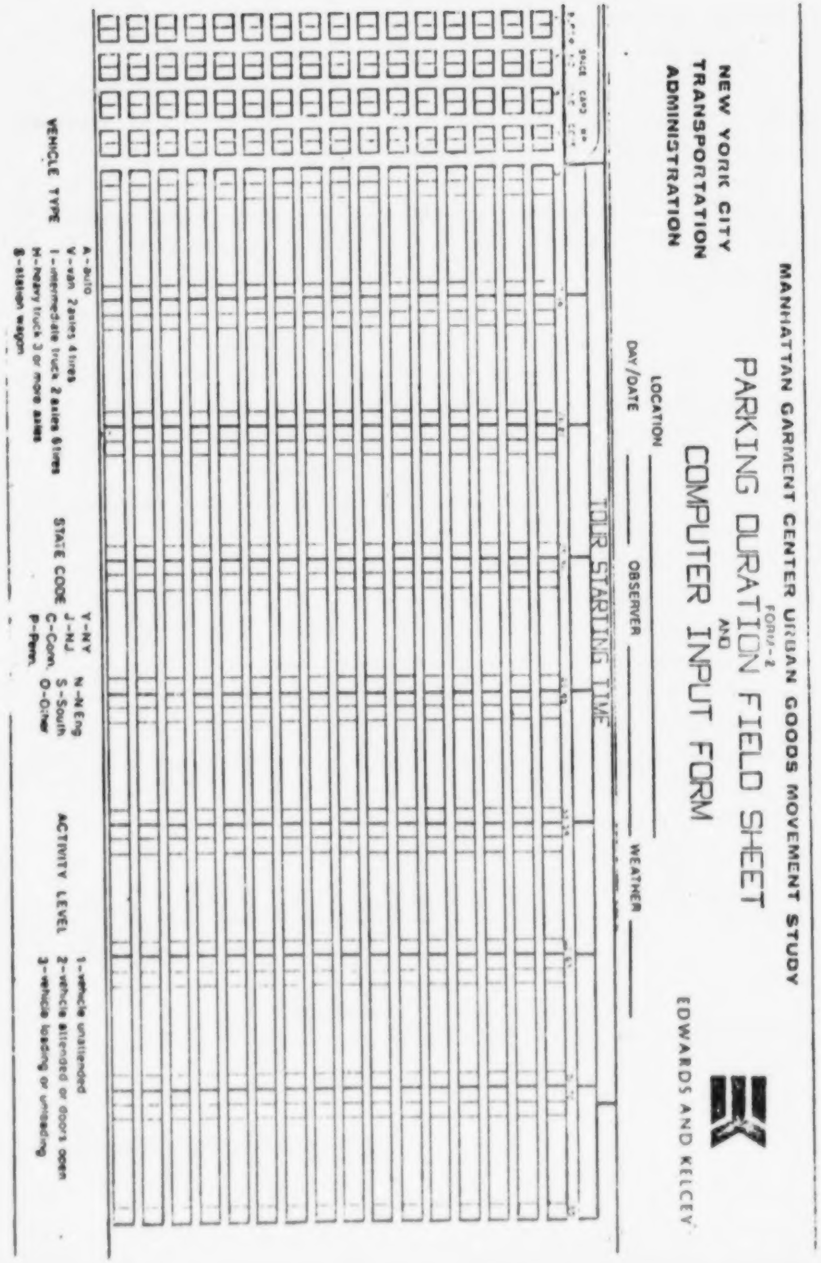

MANHATTAN GARMENT CENTER URBAN GOODS MOVEMENT STUDY

FORM-2

PARKING DURATION FIELD SHEET
AND
COMPUTER INPUT FORM

NEW YORK CITY
TRANSPORTATION
ADMINISTRATION

EDWARDS AND KELCEY

LOCATION ____________

DAY/DATE ________ OBSERVER ____________ WEATHER ________

TOUR STARTING TIME

VEHICLE TYPE
A-auto
V-van 2 axles 4 tires
I-intermediate truck 2 axles 6 tires
H-heavy truck 3 or more axles
S-station wagon

STATE CODE
Y-NY
J-NJ
C-Conn.
P-Penn.
N-N Eng
S-South
O-Other

ACTIVITY LEVEL
1-vehicle unattended
2-vehicle attended or doors open
3-vehicle loading or unloading

TRANSPORTATION ADMINISTRATION

## MANHATTAN GARMENT CENTER URBAN GOODS MOVEMENT STUDY
## COMMERCIAL VEHICLE CIRCULATION
## (FORM 3)

WEATHER:
LOCATION:

DAY:
DATE:

| VEHICLE TYPE | LICENSE PLATE | STATE | VEHICLE TYPE | LICENSE PLATE | STATE | VEHICLE TYPE | LICENSE PLATE | STATE |
|---|---|---|---|---|---|---|---|---|
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## INSTRUCTIONS FOR COMMERCIAL VEHICLE CIRCULATION

## FORM 3

SURVEY: Continuous from 7:30 A.M. to 5:30 P.M.

Record the vehicle type, complete license plate information and the state of registering for each COMMERCIAL vehicle entering the study block. The above data is recorded in 5 minutes groups. At the beginning of each 5 minute period enter the time in License Plate column and continue with the observation.

DO NOT RECORD AUTOMOBILES OR TAXIS

Example:

| VEHICLE TYPE | LICENSE PLATE | STATE |
|---|---|---|
| | 7:30 | |
| V | 775 820 | Conn |
| V | XOP 610 | NJ |
| I | HV 2775 | NY |
| H | 6662H | NY |
| I | 285 CCH | NY |
| | 7:35 | |
| I | 557-222 | NY |
| | etc | |
| | | |
| | | |

**VEHICLE TYPES:**

V = Van, Light Turck, 2 axles, 4 tires

I = Intermediate Truck - 2 axles, 6 tires

H = Heavy Truck with 3 or more axles, single or double unit.

## MANHATTAN GARMENT CENTER URBAN GOODS MOVEMENT STUDY
## PEDESTRIAN AND HANDCART OBSERVATIONS
## (FORM 4)

WEATHER:
LOCATION:
DAY:
DATE:

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|
| SAMPLE # | TYPE | TIME PERIOD | DESTINATION* | START POINT | ELAPSED TIME | OPTIMUM TIME | DISTANCE | REMARKS |
| | | | | | | | | |
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## INSTRUCTIONS FOR PEDESTRIAN AND HANDCART OBSERVATIONS

### FORM 4

Survey Period: 7:30 A.M. to 5:30 P.M.

A. Select at random a handcart entering the study block, start the stop watch, and record the following data:

1. Sample number - consecutive starting with #1.
2. Sample type - C = handcart, FP = pedestrian (female), MP = pedestrian (male).
3. Time period - Record the hour during which the observation is made.
4. Destination - Building number or name. If the sample goes to a parked vehicle, mark "Truck", "Auto", etc. and the building number at which the vehicle is parked. If the sample goes through the block, mark "X".
5. Start point - Avenue or street from which sample entered study block.
6. Elapsed time - when the sample reaches the destination, stop the watch, record the minutes and seconds and reset the stop watch to zero.

7&8. Do not use.

9. Remarks - Record any occurrences which interfered with normal movement of the person or handcart. Example: Window shopping, waited for a truck to back out, stopped to chat, etc.

B. Select at random a handcart entering the study block at the other end and record the data in columns 1-6 and 9 as above.

C. Select at random a pedestrian entering the study block and follow procedures A & B. Select your samples so that there will be approximately twice as many handcarts samples as pedestrian samples.

Write your name on the line marked "OBSERVER" and make sure that Weather, Location, Day, and Date information has been recorded.

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## MANHATTAN GARMENT CENTER URBAN GOOD MOVEMENT STUDY

## CURBSIDE VEHICLE OBSERVATION

### FORM 5
revised

SAMPLE NO- ______
SURVEY LOCATION- ______________________

DAY- ________
DATE- ________
WEATHER- ______

Parking Location ______________________

Vehicle Type 1. Auto 2. Van 3. Intermediate 4. Heavy 5. Other     No. of Axles - 2 3 4 5 6

Loading Door Used: 1. Sidewalk Side 2. Street Side 3. Back End     Power Tailgate Yes No In Use Yes No

Owner ______________________     License Plate # ______________

Entry Time -     % Load     Exit Time     % Load

| activity no. | activity code | time start | product class | stage of compl | mhu | number of units | number of loaded carts | time end | delivery/pickup address |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | |
| 2 | | | | | | | | | |
| 3 | | | | | | | | | |
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| 17 | | | | | | | | | |
| 18 | | | | | | | | | |
| 19 | | | | | | | | | |
| 20 | | | | | | | | | |

Activity Co

1. Unloading
2. Loading
3. Service Call

Production Classification

1. Deadhead
2. Dresses
3. Ladies Sportswear
4. Ladies Coats & Suits
5. Children's Wear
6. Men's Clothing
7. Piece Goods
8. Trim
9. Shipping Supplies
10. Food
11. Refuse
12. Other

Stage of Completion

1. Deadhead
2. Piece Goods
3. Processed Piece Goods
4. Trim
5. Cut Goods
6. Sewn Goods
7. Finished Goods
8. Shipped Goods
9. Other

Material Hand Units (M. H. U.)

1. Package Goods
2. Bundle
3. Bag
4. Roll
5. Loose Hange
6. Other (Special)

## INSTRUCTIONS FOR CURBSIDE VEHICLE OBSERVATIONS

### FORM 5

Survey Period: Continuous from 7:30 to 5:30 P.M.

Observe vehicle movement and loading activity at the designated area of curb and record the following information for each vehicle:

1. Sample number - Starting with No. 1 assign a unique number for each vehicle being observed.
2. Entry and Exit Time - Record the clock time when the vehicle parks (or double parks) and leaves the parking space. When loading/unloading activity takes place, record the percent of load by volume at entry and exit.
3. Owner - Record the owner's name, truck number (if any) and license plate number. For Tractor-Trailer vehicles when the cab and trailer information differs, enter both.
4. Vehcile Type, Number of Axles and Loading Doors - Circle the appropriate number. Check for power tail gate and its use.

The following information is recorded for each loading activity:

1. Activity Code - Enter the appropriate number.
2. Start Time - Record the clock time when the loading activity starts. (Hours and minutes)
3. Product Classification and Stage of Completion - Enter the appropriate numbers.
4. Material Handling Units (M. H. U.) - Enter the type of packaging code and record the number of units handled.
5. Delivery/Pickup Address - Record the address where the shipment is delivered to or picked up from.
6. Number of Handcarts - Record the number of loaded handcarts used for the activity.
7. End Time - Record the clock time when the loading activity is completed.

Note that more than one loading activity can take place at one vehicle simultaneously. Record all activities using additional forms as required. On subsequent forms only the sample number is needed in the vehicle description section.

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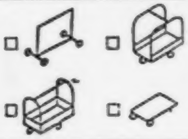
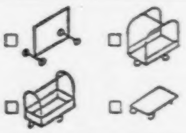
MANHATTAN GARMENT CENTER URBAN GOODS MOVEMENT STUDY
NEW YORK CITY TRANSPORTATION ADMINISTRATION
FORM 6: HANDCART ACTIVITY OBSERVATION

Day ____
Date ____
Weather ____
Sheet ____ Of ____

| | A | B |
|---|---|---|
| 1 | Time: Initiation of Round Trip | Time: Completion of Round Trip |
| 2 | Origin of Activity Within Sample Block:<br>Name of Truck/ Terminal Co. ____<br>License No. ____<br>State ____<br>Address (Park/Term) ____<br>Or<br>Name of Garment Co. ____<br>Address ____<br>Floor ____ | Origin of Activity: ☐ Within Sample Block ☐ Outside Sample Block<br>Name of Truck/ Terminal Co. ____<br>License No. ____<br>State ____<br>Address (Park/Term) ____<br>Or<br>Name of Garment Co. ____<br>Address ____<br>Floor ____ |
| 3 | Type of Goods Observed<br>☐ Deadhead (Empty)<br>☐ Piece Goods<br>☐ Trim<br>☐ Cut Goods<br>☐ Sewn Goods<br>☐ Finished Goods<br>☐ Shipped Goods<br>☐ Other ____ (Specify) | Type of Goods Observed<br>☐ Deadhead (Empty)<br>☐ Piece Goods<br>☐ Trim<br>☐ Cut Goods<br>☐ Sewn Goods<br>☐ Finished Goods<br>☐ Shipped Goods<br>☐ Other ____ (Specify) |
| 4 | Cart and Utilization<br>____ %<br>Capacity Utilization<br>☐ Person<br>☐ ✓<br> | Cart and Utilization<br>____ %<br>Capacity Utilization<br>☐ Person<br>☐ ✓<br> |
| 5 | Carts per Trip ____<br>Workers per Trip ____<br>Workers Helping Load ____ | Carts per Trip ____<br>Workers per Trip ____<br>Workers Helping Load ____ |
| 6 | Time to Obtain Load (Ex: Truck to Curb) ☐ No Load ☐ Preloaded | Time to Obtain Load (Ex: Truck to Curb) ☐ No Load ☐ Preloaded |
| 7 | Administrative Time (Explain): ☐ None | Administrative Time (Explain): ☐ None |
| 8 | Departure Time | Departure Time |
| 9 | Length of Queue ____ Time in Queue ____<br>No. of Frt. Lifts ____ ☐ Elevator Not Used At Departure<br>Elevator Time ____ | Length of Queue ____ Time in Queue ____<br>No. of Frt. Lifts ____ ☐ Elevator Not Used At Departure<br>Elevator Time ____ |
| 10 | Street Travel Time (Include Delays) | Street Travel Times (Include Delays) |
| 11 | Intrabuilding Travel Time for Multiple PU/Deliveries | Intrabuilding Travel Time for Multiple PU/Deliveries |
| 12 | Arrival Time | Arrival Time |
| 13 | Length of Queue ____ Time in Queue ____<br>No. of Frt. Lifts ____ ☐ Elevator Not Used At Arrival<br>Elevator Time ____ | Length of Queue ____ Time in Queue ____<br>No. of Frt. Lifts ____ ☐ Elevator Not Used At Arrival<br>Elevator Time ____ |
| 14 | Elapsed time before being received ____<br>Time to Unload ____ ☐ No Unload<br>Workers Helping Unload ____ ☐ Left Load | Elapsed time before being received ____<br>Time to Unload ____ ☐ No Unload<br>Workers Helping Unload ____ ☐ Left Load |
| 15 | Administrative Time (Explain): ☐ None<br>Type of Paper Transfer<br>☐ C.O.D.<br>☐ Bill of Lading<br>☐ None<br>☐ Memo<br>☐ ____ Specify Other | Administrative Time (Explain): ☐ None<br>Type of Paper Transfer<br>☐ C.O.D.<br>☐ Bill of Lading<br>☐ None<br>☐ Memo<br>☐ ____ Specify Other |
| 16 | Time Trip Complete | Time Trip Complete |
| 17 | Elapsed time before beginning new trip (Explain) | Elapsed time before beginning new trip (Explain) |

## FORM 6 - INSTRUCTIONS

The supervisor will assign you to follow a worker during his work cycles for a period of up to two hours. The data sheets should be sequentially numbered from the beginning of the day. Record your name and date on each sheet. One form should be used per round trip with "Side A" used for that part of the trip that originates within sample block and "Side B" for the return trip.

Do not leave your work before the relief man arrives or allowed to do so by the supervisor.

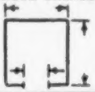
| Block No. | Instruction Guidelines |
|---|---|
| 1. | At the beginning of the trip segment, record the current time. |
| 2. | The origin of activity will be a truck or terminal or garment company. If terminal - record name, address, origination(s) of load to terminal. If truck - record name, license plate number, origination(s) of load to truck. If garment company - record name, address, floor.<br>The origination/destination information may be obtained from the shipping or receiving clerk - if not otherwise determinable. |
| 3. | Check vehicle type, number of axles and record approximate length of truck bed. |
| 4. | To best of ability, check the product classification. An empty truck is deadhead, specify other if not listed. |
| 5. | To best of ability, check the stage of product completion. An empty truck is deadhead, specify other if not listed. |
| 6. | Check the material handling unit and accurately estimate the number of checked units. |
| 7. | Shown are typical carts. Sketch outline of load on cart and estimate utilization as percent of capacity. |
| 8. | Record the carts and workers on the trip. Excluding the workers on the trip, record the number of workers helping load the cart. |
| 9. | Record the elapsed time (if applicable) to obtain the load. An example would be the time required to load the cart. |
| 10. | Record the elapsed time and nature of administrative duties such as reviewing paperwork, signing name, verifying counts, etc. |
| 11. | Record the departure current time from the origin listed in #2. |
| 12. | If at departure an elevator trip is required, note the length of queue (length of persons waiting with your worker included) and the elapsed time spent in the queue. Also note the number of freight lifts available and the elapsed time spent on the elevator. |
| 13. | Record the net elapsed travel time from the point of departure in #11 to the arrival time in #15, excluding queue time, elevator time and delays. |
| 14. | Record the nature and elapsed times of delays. Delays include traffic signals, congestion, etc. If worker stops for a break, note if occurred during travel time, before departure or after arrival time. |
| 15. | Record the arrival current time from the origin listed in #2. |
| 16. | If at arrival an elevator trip is required, note the length of queue and the elapsed time spent in the queue. Also note the number of freight lifts available and the elapsed time spent on the elevator. |
| 17. | Record the elapsed time (if applicable) to unload. An example would be the time required to unload the cart. Excluding the workers on the trip, record the number of workers helping unload the cart. |
| 18. | Record the elapsed time and nature of administrative duties such as reviewing paperwork, getting approval for COD, signing name, verifying counts, etc. Note the type of paperwork involved. |
| 19. | Record the current time when the trip segment is complete. |
| 20. | Mark the route of the trip on the reverse side, recording street numbers if not shown. |

MANHATTAN GARMENT CENTER URBAN GOODS MOVEMENT STUDY
NEW YORK CITY TRANSPORTATION ADMINISTRATION
FORM 7a: ELEVATOR ACTIVITY OBSERVATION
DETAIL & CODE SHEET

OBSERVER ____________
DAY ____________
DATE ____________
SHEET ______ OF ______

1 BUILDING ADDRESS ____________
FREIGHT ENTRANCE ____________
PASSENGER ELEVATORS ______ FREIGHT ELEVATORS ______

2 FREIGHT ELEVATOR DETAILS:
INTERIOR PLATFORM DIMENSIONS
DOOR WIDTH



SPEED: ________ fpm
CAPACITY: ________ lbs
APPROX. AGE: ________
FLOORS SERVICED: ________
AUTOMATIC LEVELERS (YES OR NO) ______

3 SUMMARIZE NATURE OF OPERATION POLICY: (EXAMPLES: ONE WAY FULL, RANDOM DEMAND, PARTIAL NOON OPERATION)

## FORM 7 - INSTRUCTIONS

**The supervisor will assign you to a freight elevator for a period of up to four hours. The data sheets should be sequentially numbered from the beginning of the day.**

**Record your name and date on each sheet. Do not leave your work before the relief man arrives or allowed to do so by the supervisor.**

**ALL INFORMATION COMPLETED AT BEGINNING OF TRIP SEGMENT.**

| Block No. | Instruction Guidelines |
|---|---|
| Blank Page | Record all tennants by floor on blank page. |
| Form 7a: | |
| 1,2 | Fill in the blanks |
| 3 | After the multi-hour observation, summarize the nature of operation policy. Note if the elevators are partially used at noon. |
| Form 7b: | |
| 4 | Record the beginning floor number. |
| 5 | As the elevator door opens, observe the length of the outside queue (line) including those that get on the elevator. |
| 6 | For the offload activity, record the quantity by type that get off the elevator at the beginning floor number. Write the quantity above the slant line if carts are empty; below line if have load. |
| 7 | For the onload activity, do same as in #6 for those that get on the elevator. |
| 8 | Record the stopping time from the time the door is opened until it is closed. |
| 9 | For those that are on the elevator during the trip segment, write the quantity above the slant line if carts are empty; below line if have load. Place an "x" in the empty trip column if there are not carts or workers being transported. |
| 10 | Record the travel time from the time the door closes until it is reopened. |

**At the stop, go back to block #4 and repeat the process.**

| | |
|---|---|
| Form 7c: | Completed only when a non-empty load is observed. Use a separate line to record each load observation. |
| 11 | Record the beginning floor number. |
| 12 | For each load, estimate % capacity utilization by cart type. |
| 13 | Record the number of carts (typically 1 or 2). |
| 14 | Place an "x" in the box for the material handling units involved. |
| 15 | Estimate the quantity of material handling units (Ex.: 20 packages or 60 hangers). |
| 16 | Place an "x" in the box for the product classification. Ask the elevator operator if in doubt. |
| 17 | Place an "x" in the box for the stage of completion observed. Finished goods generally go up the elevator and shipped goods to retail customers down the elevator. |
| 18 | Record the destination floor number. |

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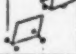
MANHATTAN GARMENT CENTER URBAN GOODS MOVEMENT STUDY
NEW YORK CITY TRANSPORTATION ADMINISTRATION
FORM 7b: ELEVATOR ACTIVITY OBSERVATION
TRIP RECORDING

OBSERVER ______
DAY ______
DATE ______
SHEET ______ OF ______

TIME BEGIN ______
TIME END ______

| 4 | 5 | 6 | | | | | | 7 | | | | | | 8 | 9 | | | | | | | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | OFFLOAD (EMPTY/LOAD) | | | | | | ONLOAD | | | | | | | BALANCE | | | | | | | |
| BEGINNING FLOOR | OUTSIDE QUEUE | PERSON W/O CART | ✓ |  | | | OTHER | PERSON W/O CART | ✓ | | | | OTHER | STOPPING TIME | EMPTY TRIP | PERSON W/O CART | ✓ | | | | OTHER | TRAVEL TIME |
| | | | | | | | | | | | | | | | | | | | | | | |
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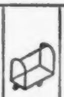
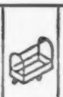
MANHATTAN GARMENT CENTER URBAN GOODS MOVEMENT STUDY
NEW YORK CITY TRANSPORTATION ADMINISTRATION
FORM 7c: ELEVATOR LOAD OBSERVATIONS

BUILDING ADDRESS ______
FREIGHT ENTRANCE ______
TIME BEGIN ______
TIME END ______

OBSERVER ______
DAY ______
DATE ______
SHEET ______ OF ______

| 11 | 12 | | | | | | 13 | 14 | | | | | | 15 | 16 | | | | | | | | 17 | | | | | | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TYPE OF CART ESTIMATE % CAPACITY UTILIZATION | | | | | | | MATERIAL HANDLING UNIT (M.H.U.) | | | | | | | PRODUCT CLASSIFICATION | | | | | | | | STAGE OF COMPLETION | | | | | | |
| ORIGINATION FLOOR | PERSON W/O CART | ✓ | |  |  | OTHER | QUANTITY OF CARTS | PACKAGED GOODS | BUNDLE | BAG | ROLL | HANGERS | OTHER | EST. QUANTITY OF M.H.U. | DRESSES | SPORTSWEAR | COATS & SUITS | CHILDRENS WEAR | FOOD | REFUSE | SHIPPING SUPPLIES | OTHER | PIECE GOODS | TRIM | CUT GOODS | SEWN GOODS | FINISHED GOODS | SHIPPED GOODS | DESTINATION FLOOR |
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SINCE 1935
KSA

MANHATTAN GARMENT CENTER URBAN GOODS MOVEMENT STUDY
NEW YORK CITY TRANSPORTATION STUDY
Form 8: Parking Proximity Study

Observer_______________
Date_______________
Day_______________
Sheet_____of_____

Time Span_________to_________

| License Number | Name of Trucking Company | Pick Up | Delivery | Building Address Where Parked | Garment Center Building Address of PU/Deliveries | | Check Product(s) Observed | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Dresses | Sportswear | Coats & Suits | Children's Wear | Piece Goods | Trim | Ship'g. Supplies | Food | Refuse | Unknown |
| | | | | | | | | | | | | | | | | |
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SINCE 1935
KSA

MANHATTAN GARMENT CENTER URBAN GOODS MOVEMENT STUDY
New York City Transportation Administration
Form 9: Duration of Inbuilding Time

Observer______________
Date______________
Sheet_____of_______

| Building Address | For Surveyors Use -ID Characteristic- | Time Inter Building | Time Exit Building | Elapsed Time |
|---|---|---|---|---|
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35th Street: 209, 212, 224, 253, 261
36th Street: 1359 Broadway, 132-38, 135-39, 141-45, 142-48
7th Avenue: 498(24 floors), 500(17 floors), 501, 512, 530
37th Street: 222, 225-35, 226, 241-45, 252, 265

Observe each building 2-3 hours

MANHATTAN GAMRENT CENTER
URBAN GOODS MOVEMENT STUDY

Apparel Questionnaire
Manufacturer/Jobber

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best available copy.

New York City
Transportation Administration

Manhattan Garment Center
Urban Goods Movement Study

## APPAREL COMPANY QUESTIONNAIRE

Interviewer ____________ Date ________ Time ________

Name of Company ____________ Interviewee ____________

Address ____________ Title ____________

____________ Phone # ____________

Years in business at this location

With same name ______ (years)

Under other name ______ give other name ______ (years)

Classify the business
☐ Manufacturer
☐ Jobber
☐ Contractor
☐ ________ Supplier
☐ ________ Other (specify)

1. Multi-location firm? ☐ Yes ☐ No

Part of another firm? ☐ Yes ☐ No

How Associated? ____________

Address ____________

Number of different phone listings at this location? ________

What are the listings or names used? ____________

2. If multi-location firm, or part of another firm, which functions are performed outside this building location?

| Function | Address | Years at Location |
|---|---|---|
| ______ | ______ | ______ |
| ______ | ______ | ______ |
| ______ | ______ | ______ |
| ______ | ______ | ______ |

3. Circle product classification manufactured or industries served. (If more than one industry, show percent by annual revenue).

|  |  | (IF APPLICABLE) Time in Days from Cut to Ship | (IF APPLICABLE) Avg Whse Value Fall | Spring |  |  | (IF APPLICABLE) Time in Days from Cut to Ship | (IF APPLICABLE) Avg Whse Value Fall | Spring |
|---|---|---|---|---|---|---|---|---|---|
| Dresses - Better | ___% | ___ | $___ | ___ | Ladies' Coats and Suits | ___% | ___ | $___ | ___ |
| Dresses - Popular | ___% | ___ | $___ | ___ | Ladies' Rainwear | ___% | ___ | $___ | ___ |
| Dresses - Moderate | ___% | ___ | $___ | ___ | Children's Wear | ___% | ___ | $___ | ___ |
| Ladies' Sportswear | ___% | ___ | $___ | ___ | Other ______ | ___% | ___ | $___ | ___ |
|  |  |  |  |  | TOTAL | 100% |  |  |  |

List and rank the garments classified as Sportswear

| Item | Rank |
|---|---|
| ______ | ___ |
| ______ | ___ |
| ______ | ___ |
| ______ | ___ |

4. a) Estimate square foot of area occupied in this building by floor for your company.

Floor____ Area (Sq. Ft.)________, Floor____ Area________, Floor____ Area________

b) What is the total monthly rental rate? $________

5. a) Check functions performed at this location. Show floor number if more than one floor is used.

| FUNCTION | CHECK if Present at Location | FLOOR if Multifloor Operation | FUNCTION | CHECK if Present at Location | FLOOR if Multifloor Operation |
|---|---|---|---|---|---|
| Piece Goods<br>Receive | ☐ | ______ |  |  |  |
| Inventory (storage)* | ☐ | ______ | Ship Cut Goods | ☐ | ______ |
| Process Piece Goods (Sponge, dye, etc.) | ☐ | ______ | Sewn Goods<br>Ship Sewn Goods | ☐ | ______ |
| Ship Piece Goods | ☐ | ______ | Finished Goods<br>Receive | ☐ | ______ |
| Cut Piece Goods | ☐ | ______ | Inventory (Storage) | ☐ | ______ } Area |
| Trim<br>Receive | ☐ | ______ | Ship | ☐ | ______ } Area |
| Inventory (storage)* | ☐ | ______ | Offices | ☐ | ______ |
| Ship | ☐ | ______ | Showroom | ☐ | ______ |
| Shipping Supplies<br>Receive | ☐ | ______ | Sample Making | ☐ | ______ |
| Inventory (Storage)* | ☐ | ______ | Pattern Making | ☐ | ______ |
| Ship | ☐ | ______ | Other ______ | ☐ | ______ |
| Cut Goods<br>Receive Cut Goods | ☐ | ______ | ______ | ☐ | ______ |
| Sew Cut Goods | ☐ | ______ | ______ | ☐ | ______ |

* Do not check if received immediately before anticipated use.

|  | Average | 1973 Range Low | 1973 Range High |
|---|---|---|---|
| b) What is the number of employees at this location? (How many of the employees belong to the ILGWU? ______) | ______ | ______ | ______ |
| What is the weekly payroll at this location? | $______ | $______ | $______ |
| c) What is the number of employees and supervisors in the receiving and shipping departments? | ______ | ______ | ______ |
| d) For the employees above, how many hours per week are directly involved in the goods movement on the street, i.e., making pickups and deliveries? | ______ | ______ | ______ |
| What is the weekly payroll of the above employees? | $______ | $______ | $______ |

6. Normal shipping and receiving hours ________

7. During the past 5 years, what type of growth has your company experienced?

| | Sales Dollars | Units Shipped |
|---|---|---|
| a) Negative | ☐ | ☐ |
| b) No change | ☐ | ☐ |
| c) Up to 5% annually | ☐ | ☐ |
| d) 5 - 10% annually | ☐ | ☐ |
| e) 10+% annually | ☐ | ☐ |

Comment on the basis of the growth or decline.

8. How much pilferage did you encounter during 1973? $__________

To the best of your knowledge, where did the pilferage occur?

| | |
|---|---|
| On Premise | ____% |
| Elsewhere Within Building | ____% |
| On Street (Not From Truck) | ____% |
| From Parked Truck | ____% |
| During Shipment | ____% |
| Don't Know | ____% |
| TOTAL | 100% |

When off premise, who suffered the loss?

What are limits of shipment theft insurance coverage and deductable amount?

What effect has the pilferage had in obtaining shipment theft or theft insurance? (Circle for which answer was given.)

What are the annual shipment theft or theft insurance premiums? (Circle for which answer was given.)

---

Name of Company________________________

9. Complete the following blanks for each function that has receiving activity at this location. Receipt activity should agree with question #5. Use additional sheets if required. Sample actual records when possible.

a) Function or item received ________ Physical handling unit when in storage ________

END OF MONTH LEVELS FOR 1973

| | | MONTHLY AVG. | PEAK MONTH | ANNUAL TOTAL |
|---|---|---|---|---|
| b) Received (Avg. Whse. Value $\_\_\_\_\_\_\_\_ if not previously given for roll of piece goods) | UNITS<br>or<br>$ | ________<br>________ | ________<br>________<br>________ (month) | ________<br>________ |
| c) Inventoried or Stocked Levels (to be completed for those items not later sold separately as part of business activity) | UNITS<br>or<br>$ | ________<br>________ | ________<br>________<br>________ (month) | |

d) Other than the peak month above, what are the other high activity months for receiving?

| | | MONTH | % OF PEAK MONTH ABOVE or UNITS RECEIVED | |
|---|---|---|---|---|
| Receiving - | Same Season | ________ | ______% | ________ |
| | - Different Season | ________ | ______% | ________ |

e) What is the estimated weight per material handling unit received?

f) For the items received above, are you charged separately for transportation?

☐ Yes, all the time. Charges for 1973 were $_____ including charges billed separately.

☐ Yes, for _____% of my deliveries, charges for 1973 were $_____ including charges billed separately.

☐ No, none of the time. The transportation cost was included in the price of my received merchandise.

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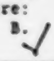
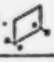
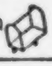
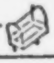
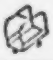
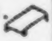
| | INTRA BUILDING | INTRA GARMENT CENTER | COMMERCIAL ZONE (free zone) | OTHER |
|---|---|---|---|---|
| g) Where were the goods shipped from? Indicate % of receipts (deliveries) that originate from each geographical area rather than sales office location visited. Obtain physical shipment origin rather than sales office location. | | | | |
| h) What is the physical handling unit at receipt? (Use % if more than one based on units. Choices are package goods, bundles, bags, rolls, loose hangers, etc.) | | | | |
| i) What cart type is used for transporting goods on the street? Choices are: A. Person B.  C.  D.  E.  F.  G.  | | | | |
| j) What is the average number of units per cart by cart type? | | | | |
| k) What is the estimated number of deliveries received? Average per week | | | | |
| Peak per week | | | | |
| l) Estimate the range of delivery sizes. Average size delivery is - units | | | | |
| Typical small deliveries average - units | | | | |
| Typical large deliveries average - units | | | | |
| m) Based on the number of deliveries received, classify the type of delivery. COLLECT | | | | |
| PREPAID | | | | |
| C.O.D. | | | | |
| OTHER | | | | |
| OTHER | | | | |
| TOTAL | 100% | 100% | 100% | 100% |

n) What means, by percent usage based on units, are used to transport the receipts from the following sources? Indicate carrier who makes final delivery to you.

| | | INTRA BUILDING | INTRA GARMENT CENTER | COMMERCIAL ZONE (free zone) | OTHER |
|---|---|---|---|---|---|
| PUSH BOYS: | Your Push boys | | | | |
| | Their Push boys | | | | |
| | TOTAL | 100% | 100% | 100% | 100% |
| TRUCK: | Your Truck | | | | |
| | Their Truck | | | | |
| | TOTAL | | | 100% | 100% |
| CARRIER TYPE: - OVER THE ROAD (line haul) | Common Carrier | | | | |
| | Contract Carrier (name if possible) | | | | |
| | Private Carrier (name if possible) | | | | |
| - OTHER | Local Truckman (name if possible) | | | | |
| | Freight Forwarder | | | | |
| | Air Freight Forwarder | | | | |
| | UPS | | | | |
| | PP | | | | |
| | TOTAL | | | 100% | 100% |

o) List the addresses of the three apparel or supply firms you receive the most receipts from. Indicate percent of total receipts from each firm either individually or on a total basis for each column.

| INTRA BUILDING | | INTRA GARMENT CENTER<br>(Building Address) | | COMMERCIAL ZONE<br>(Free-Zone)<br>(County or City) | | OTHER<br>(State, Region or Country) | |
|---|---|---|---|---|---|---|---|
| ______________ | ___% | ______________ | ___% | ______________ | ___% | ______________ | ___% |
| ______________ | | ______________ | | ______________ | | ______________ | |
| ______________ | ___% | ______________ | ___% | ______________ | ___% | ______________ | ___% |
| ______________ | | ______________ | | ______________ | | ______________ | |
| ______________ | ___% | ______________ | ___% | ______________ | ___% | ______________ | ___% |
| ______________ | | ______________ | | ______________ | | ______________ | |

(maximum total per column 100%)

Name of Company________________________________

10. Complete the following blanks for each function that has shipping activity at this location. Shipping activity should agree with question #5. Use additional sheets if required. Sample actual records when possible.

a) Function or item received _________ Physical handling when in storage_________

END OF MONTH LEVELS FOR 1973

| | | MONTHLY AVG. | PEAK MONTH | ANNUAL TOTAL |
|---|---|---|---|---|
| b) Shipments<br>(Avg. Whse. Value $_________)<br>if not previously given<br>-per roll of piece goods<br>-per shipping carton | UNITS<br>or<br>$ | ____________<br>____________ | ____________<br>____________<br>____________<br>(month) | ____________<br>____________ |
| c) Inventory Levels | UNITS<br>or<br>$ | ____________<br>____________ | ____________<br>____________<br>____________<br>(month) | |

d) Other than the peak month above, what are the other high activity months for shipping?

| | MONTH | % OF PEAK MONTH ABOVE | or UNITS SHIPPED |
|---|---|---|---|
| Shipping - Same Season | ____________ | ________% | ____________ |
| -Different Season | ____________ | ________% | ____________ |

e) For the product sold what is the % of returned units and typical return shipment size?

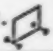
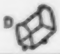
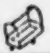
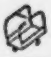
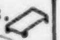
f) What is the estimate weight per material handling unit shipped? (List unit used)

g) For the items shipped above, did you charge separately for transportation?

☐ Yes, all the time.

☐ Yes, for ____% of my shipments. Describe criteria to charge or not charge separately.

☐ No, none of the time. The cost of transportation was included in the price of my shipped merchandise.

|  | INTRA BUILDING | INTRA GARMENT CENTER | COMMERCIAL ZONE (free zone) | OTHER |
|---|---|---|---|---|
| h) Where were the goods shipped to? Indicate % of shipments that terminate in each geographical area listed. The indicated area should be the first contact the shipment has with the customer's facility. |  |  |  |  |
| i) What is the physical handling unit at shipment? (Use % if more than one based on units. Choices are package goods, bundles, bags, rolls, loose hangers, etc.) |  |  |  |  |
| j) What cart type is used for transporting goods on the street? Choices are: A. Person B. ✓ C.  D.  E.  F.  G.  |  |  |  |  |
| k) What is the average number of units per cart by cart type? |  |  |  |  |
| l) What is the estimated number of shipments made? Average per week |  |  |  |  |
| Peak per week |  |  |  |  |
| m) Estimate the range of the shipment sizes. Average size shipment is - units |  |  |  |  |
| Typical small shipment average - units |  |  |  |  |
| Typical large shipment average - units |  |  |  |  |
| n) Based on the number of shipments made, classify the type of shipments. COLLECT |  |  |  |  |
| PREPAID |  |  |  |  |
| C.O.D. |  |  |  |  |
| OTHER |  |  |  |  |
| OTHER |  |  |  |  |
| TOTAL | 100% | 100% | 100% | 100% |

o) What means, by percent usage based on units, are used to transport the shipments initially from your facility?

|  |  | INTRA BUILDING | INTRA GARMENT CENTER | COMMERCIAL ZONE (free zone) | OTHER |
|---|---|---|---|---|---|
| PUSH BOYS: | Your Push Boys |  |  |  |  |
|  | Their Push Boys |  |  |  |  |
|  | TOTAL | 100% | 100% | 100% | 100% |
| TRUCK: | Your Truck |  |  |  |  |
|  | Their Truck |  |  |  |  |
|  | TOTAL |  |  | 100% | 100% |
| CARRIER TYPE: - OVER THE ROAD (line haul) | Common Carrier |  |  |  |  |
|  | Contract Carrier (name if possible) |  |  |  |  |
|  | Private Carrier (name if possible) |  |  |  |  |
| - OTHER | Local Truckman (name if possible) |  |  |  |  |
|  | Freight Forwarder |  |  |  |  |
|  | Air Freight Forwarder |  |  |  |  |
|  | UPS |  |  |  |  |
|  | PP |  |  |  |  |
|  | TOTAL |  |  | 100% | 100% |

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p) List the addresses of the three apparel, supply companies or distribution centers you make the most shipments to. Indicate percent of shipments to each firm.

| | INTRA BUILDING | INTRA GARMENT CENTER<br>(Building Addresses) | COMMERCIAL ZONE<br>(free zone)<br>(County or City) | OTHER<br>(State, Region or Country) |
|---|---|---|---|---|
| 1 | ______ __% | ______ __% | ______ __% | ______ __% |
| | ______ | ______ | ______ | ______ |
| 2 | ______ __% | ______ __% | ______ __% | ______ __% |
| | ______ | ______ | ______ | ______ |
| 3 | ______ __% | ______ __% | ______ __% | ______ __% |
| | ______ | ______ | ______ | ______ |

(maximum total per column 100%)

q) What is the length of in-transit time if known?

| LOAD ORIGINATION | CHECK<br>HOURS | CHECK<br>DAYS | ACTUAL<br>LOW | ACTUAL<br>AVERAGE | ACTUAL<br>HIGH | DESIRABLE |
|---|---|---|---|---|---|---|
| Intra Garment Center | ☐ | ☐ | ______ | ______ | ______ | ______ |
| Commercial Zone | ☐ | ☐ | ______ | ______ | ______ | ______ |
| Other (list from "o" above) ______ | ☐ | ☐ | ______ | ______ | ______ | ______ |
| ______ | ☐ | ☐ | ______ | ______ | ______ | ______ |
| ______ | ☐ | ☐ | ______ | ______ | ______ | ______ |

r) Describe how you obtain freight service. On what basis and how reliable is the response?

What is the range and average length of time for a response?

s) How did you select your trucking company?

11. Describe documentation, paperwork or other means to control flow from administrative point of view. Determine points of "paper" transfer and count verification.

a) For pickups at your facility
   - -Runner
   - -At your facility
   - -Accompanying transfer to other or freight facility

b) For deliveries to your facility
   - -Accompanying transfer to your facility
   - -Runner
   - -At your facility

12. What improvements do you see possible in the goods movement?
   - -On short term basis?
   - -On long term basis?

(OPTIONAL - FOR THOSE THAT HAVE MOVED OPERATIONS INTO OR OUT OF GARMENT CENTER)

13. Indicate the reasons for your latest move.

| Most Important | Important | Not Applicable | |
|---|---|---|---|
| ☐ | ☐ | ☐ | To obtain space on (higher) (lower) floor |
| ☐ | ☐ | ☐ | To obtain (more) (less) space |
| ☐ | ☐ | ☐ | To obtain cheaper space |
| ☐ | ☐ | ☐ | To consolidate onto single floor |
| ☐ | ☐ | ☐ | To locate in newer building |
| ☐ | ☐ | ☐ | To be closer to mass transit |
| ☐ | ☐ | ☐ | To be closer to freight terminals |
| ☐ | ☐ | ☐ | Easier to ship and receive at new location |
| ☐ | ☐ | ☐ | To have safer location for goods and personnel |
| ☐ | ☐ | ☐ | Previous lease terminated |
| ☐ | ☐ | ☐ | Better labor availability |
| ☐ | ☐ | ☐ | Lower labor cost |
| ☐ | ☐ | ☐ | Accessibility to market |
| ☐ | ☐ | ☐ | Accessibility to other parts of existing operation |
| ☐ | ☐ | ☐ | Accessibility to suppliers |
| ☐ | ☐ | ☐ | Tax advantages |

# MANHATTAN GARMENT CENTER
# URBAN GOODS MOVEMENT STUDY

## Apparel Questionnaire
## Contractor

New York City
Transportation Administration

1

Manhattan Garment Center
Urban Goods Movement Study

## APPAREL COMPANY QUESTIONNAIRE

Interviewer ____________ Date ________ Time ________

Name of Company ____________ Interviewee ____________

Address ____________ Title ____________

____________ Phone # ____________

1. How many years have you been in business at this location ____________

2. Circle product classification of _ industries served. (If more than one industry, show percent by annual revenue).

| | | (IF APPLICABLE) Time in Days from Cut to Ship | Avg Whse Value Fall | Spring |
|---|---|---|---|---|
| Dresses - Better | ____% | ____ | $____ | ____ |
| Dresses - Popular | ____% | ____ | $____ | ____ |
| Dresses - Moderate | ____% | ____ | $____ | ____ |
| Ladies' Sportswear | ____% | ____ | $____ | ____ |
| Ladies' Coats and Suits | ____% | ____ | $____ | ____ |
| Ladies' Rainwear | ____% | ____ | $____ | ____ |
| Children's Wear | ____% | ____ | $____ | ____ |
| Other ________ | ____% | ____ | $____ | ____ |
| TOTAL | 100% | | | |

List and rank the garments classified as Sportswear

| Item | Rank |
|---|---|
| ____________ | ____ |
| ____________ | ____ |
| ____________ | ____ |
| ____________ | ____ |

a) Estimate square foot of area occupied in this building by floor for your company.

Floor ____ Area (Sq. Ft.) ________, Floor ____ Area ________, Floor ____ Area ______

b) What is the total monthly rental rate? $________ OPTIONAL

| | YES | NO |
|---|---|---|
| 4. a. Do you receive cut goods and ship sewn goods | ☐ | ☐ |
| b. Do you receive trim together with the cut goods or separately | ☐ | ☐ |
| | ☐ | ☐ |
| c. Do you receive piece goods | ☐ | ☐ |
| d. What other major items do you receive | | |

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2

| | AVG. 1973 | LOW | HIGH |
|---|---|---|---|
| 5. What is the total number of employees at this location | ____ | ____ | ____ |
| What is the average weekly payroll at this location for all employees | ______ | | |
| What is the number of workers and supervisors in the shipping and receiving rooms | ______ | | |
| What is the weekly payroll of these employees | ________ | | |
| On the average, how many hours per week are spent by your workers in making pick-ups and deliveries? | ________ | | |
| What are the normal shipping and receiving hours? | ________ | | |

6. During the past 5 years, what type of growth has your company experienced?

| | Sales Dollars | Units Shipped |
|---|---|---|
| a) Negative | ☐ | ☐ |
| b) No change | ☐ | ☐ |
| c) Up to 5% annually | ☐ | ☐ |
| d) 5 - 10% annually | ☐ | ☐ |
| e) 10+% annually | ☐ | ☐ |

Comment on the basis of the growth or decline.

7. How much pilferage did you encounter during 1973? $__________

8. Do you charge separately for transportation?

| | | | | | | |
|---|---|---|---|---|---|---|
| Pick-up | YES | ____ | SOMETIMES | ____$ | NEVER | ____ |
| DELIVERIES | YES | ____ | SOMETIMES | ____$ | NEVER | ____ |

9. What was your 1973 transportation bill?

10. How often do you obtain freight service? Pickups ________ Deliveries ______

11. When do you obtain freight service

Can you call up for special pickups and/or deliveries?
How long before the truck shows up?

| | INTRA BUILDING | INTRA GARMENT CENTER | COMMERCIAL ZONE (free zone) | OTHER |
|---|---|---|---|---|
| d. Where were the goods shipped to? Indicate % of shipments that terminate in each geographical area listed. The indicated area should be the first contact the shipment has with the customer's facility. | | | | |
| e. What is the physical handling unit at shipment? (Use % if more than one based on units. Choices are package goods, bundles, bags, rolls, loose hangers, etc.) | | | | |
| f. What is the estimated number of shipments made? Average per week | | | | |
| Peak per week | | | | |
| g. Estimate the range of the shipment sizes. Average size shipment is - units | | | | |
| Typical small shipment average - units | | | | |
| Typical large shipment average - units | | | | |

h. How are goods transported from your facility?

| | | | INTRA BUILDING | INTRA GARMENT CENTER | COMMERCIAL ZONE (free zone) | OTHER |
|---|---|---|---|---|---|---|
| PUSH BOYS: | | Your Push Boys | | | | |
| | Manufacturer Trucker | Their Push Boys | | | | |
| | | TOTAL | 100% | 100% | 100% | 100% |
| TRUCK: | Name | Your Truckman | | | | |
| | Name | Your Truckman | | | | |
| | | TOTAL | | | 100% | 100% |

SHIPMENT OF GOODS

a. How many garments did your firm sew during 1973 ____________

b. How many garments did your firm sew in an average month ____________

c. What are your two or three months of peak activity? How many units did you ship during these months?

| MONTH | UNITS |
|---|---|
| ____________ | ____________ |
| ____________ | ____________ |
| ____________ | ____________ |

i. List the addresses of the three apparel, supply companies or distribution centers you make the most shipments to. Indicate percent of shipments to each firm.

| INTRA BUILDING | INTRA GARMENT CENTER<br>(Building Addresses) | COMMERCIAL ZONE<br>(free zone)<br>(County or City) | OTHER<br>(State, Region or Country) |
|---|---|---|---|
| 1 ________ ___% | ________ ___% | ________ ___% | ________ ___% |
| ________ | ________ | ________ | ________ |
| 2 ________ ___% | ________ ___% | ________ ___% | ________ ___% |
| ________ | ________ | ________ | ________ |
| 3 ________ ___% | ________ ___% | ________ ___% | ________ ___% |
| ________ | ________ | ________ | ________ |

(maximum total per column 100%)

Refer to question 4

j. By what means, in percentage terms, do units of ________ arrive at your facility.

| | | INTRA BUILDING | INTRA GARMENT CENTER | COMMERCIAL ZONE<br>( free zone) | OTHER |
|---|---|---|---|---|---|
| PUSH BOYS | your boys | | | | |
| | their boys | | | | |
| | TOTAL | 100% | 100% | 100% | 100% |
| TRUCK | your truck | | | | |
| | local truckman | | | | |

Origin of shipments

k. List the addresses of the three apparel or supply firms you receive the most receipts from. Indicate percent of total receipts from each firm either individually or on a total basis for each column.

| INTRA BUILDING | INTRA GARMENT CENTER<br>(Building Address) | COMMERCIAL ZONE<br>(Free-Zone)<br>(County or City) | OTHER<br>(State, Region or Country) |
|---|---|---|---|
| 1 ________ ___% | ________ ___% | ________ ___% | ________ ___% |
| ________ | ________ | ________ | ________ |
| 2 ________ ___% | ________ ___% | ________ ___% | ________ ___% |
| ________ | ________ | ________ | ________ |
| 3 ________ ___% | ________ ___% | ________ ___% | ________ ___% |
| ________ | ________ | ________ | ________ |

(maximum total per column 100%)

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# MANHATTAN GARMENT CENTER
# URBAN GOODS MOVEMENT STUDY

## Trucker Questionnaire
## Face-to-Face Form

Manhattan Garment Center
Urban Goods Movement Study

FREIGHT SERVICE, FACILITIES &
OPERATIONS FIELD INTERVIEW GUIDE

Firm Name ____________________

Person Responding ____________________

Title ____________________

Address ____________________

Phone ____________________
Home Office
Location ____________________

| **Check** | **Type of Firm** |
|---|---|
| ☐ | A. Common Carrier |
| ☐ | B. Local Truckman |
| ☐ | C. Contract Carrier |
| ☐ | D. Private Carrier |
| ☐ | E. Freight Forwarder |
| ☐ | F. Air Freight Forwarder |
| ☐ | G. Consolidator |
| ☐ | H. Other |

| **TYPE OF GOODS HANDLED** | **% of Annual Revenue** | **Physical Characteristic of Goods (indicate % occurrence)** | | |
|---|---|---|---|---|
| | | **Packaged** | **Hanging or Loose** | **Other** |
| A. Piece Goods | ____% | ____ | ____ | ____ |
| B. Cut Goods | ____% | ____ | ____ | ____ |
| C. Trim | ____% | ____ | ____ | ____ |
| D. Sewn Goods | ____% | ____ | ____ | ____ |
| E. Finished Goods | ____% | ____ | ____ | ____ |
| F. Shipped Goods | ____% | ____ | ____ | ____ |
| G. Shipping Supplies | ____% | ____ | ____ | ____ |
| H. Other Garment Traffic | ____% | ____ | ____ | ____ |
| I. Other ________ (specify) | ____% | ____ | ____ | ____ |
| TOTAL | 100% | | | |

| **INDUSTRY SEGMENT SERVED** | **% of Annual Revenue** |
|---|---|
| A. Piece Goods Supplier | ____% |
| B. Trim Supplier | ____% |
| C. Ladies Dresses | ____% |
| D. Ladies Sportswear | ____% |
| E. Ladies Coats & Suits | ____% |
| F. Ladies Rainwear | ____% |
| G. Children's Wear | ____% |
| H. Shipping Supplies Supplier | ____% |
| I. Other ________ (specify) | ____% |
| TOTAL | 100% |

**TYPE & NUMBER OF FACILITIES WHICH SERVICE THE GARMENT CENTER**

Number of Terminals ________

Number of Stores ________

Number of Freight Halls ________

Other (Curbside or Sidewalk) ________

## VOLUME

Indicate average daily, weekly or annual

| | PIECE GOODS | CUT GOODS | TRIM | SEWN GOODS | FINISHED GOODS | SHIPPED GOODS | | SHIPPING SUPPLIES | OTHER GARMENT TRAFFIC | NON GARMENT TRAFFIC |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | box | hanging | | | |
| Average number of pounds or Average number of units | | | | | | | | | | |
| | | | | | | | | | | |
| Describe unit | | | | | | box | hanging | | | |
| % Transported into Garment Center | | | | | | | | | | |
| % Transported out of Garment Center | | | | | | | | | | |

Indicate average daily, weekly or annual

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| How many Pickups? (truck) | | | | | | | | | |
| How many Deliveries? (truck) | | | | | | | | | |
| How many Pickups? (runners) | | | | | | | | | |
| How many Deliveries? (runners) | | | | | | | | | |

Complete the following for each Facility (use additional sheets if needed)

**Facility Address** ________________________________

________________________________

Annual Revenue

$ 0-49,999 ☐

50-99,999 ☐

100-299,999 ☐

300-499,999 ☐

500-1 million ☐

over 1 million ☐

Number of Employees (including management & office help). . . . . . ____________

If contractual labor what Union: ☐ Teamster ☐ ILGWU

Average hours per week per employee . . . . . . . ____________

Normal operating hours. . . . . . . . . . . . ____________

Number of off-street doors or loading bays. . . ____________

Number of square feet used in area facility . . ____________

Annual rental or ownership cost per square foot ____________

VEHICLES SERVING GARMENT CENTER

| | Automobile | Vans<br>2 axles, 4 tires | Intermediate trucks<br>2 axles, 6 tires | Heavy Trucks<br>3 or more axles |
|---|---|---|---|---|
| Number Owned | ______ | ______ | ______ | ______ |
| Number Leased | ______ | ______ | ______ | ______ |
| Average Age | ______ | ______ | ______ | ______ |
| Avg. Vehicle Miles per week per vehicle | ______ | ______ | ______ | ______ |
| Avg. fuel consumption per week per vehicle | ______ | ______ | ______ | ______ |

Night parking location: Address ______________________________

☐ Terminal ☐ Garage ☐ Parking Lot ☐ Street ☐ Other

MATERIAL HANDLING EQUIPMENT

Quantity

Fork Lifts

______

Flat Bed Platform Trucks

or

______

Racks Quantity

______

______

______

______

Do you palletize large orders? ______

Do you own or use conveyors? ______ Describe how: ______________________

Do you use any mechanical assistance to transfer shipments between the sidewalk and truck? ☐ Yes ☐ No

Describe how:

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1. On inbound shipments into the Garment Center, are the deliveries made directly from your truck? ☐

or are they first unloaded at your facility and then manually delivered? ☐

If both methods are used, what determines the delivery policy?

______________________________

______________________________

______________________________

2. For inbound shipments, list the address or location of the three apparel or transport firms that you receive the most shipments from for delivery into the Garment Center.

______________________________

______________________________

______________________________

3. For inbound shipments, list the building addresses of the three apparel or transport firms that you make the most deliveries to in the Garment Center.

______________________________

______________________________

______________________________

4. On inbound shipments, how were the goods loaded onto your truck?

☐ Manually transferred from a handcart to the truck

☐ Loaded handcart pushed onto the truck and remains loaded until delivery

☐ Transferred from a conveyor or other mechanical system (overhead, trolley, etc.) onto the truck

☐ Describe other

______________________________

______________________________

______________________________

5. For outbound shipments from the Garment Center, are the pickups made directly by your truck? ☐

or are they first picked up and brought to your facility before being loaded onto your truck? ☐

If both methods are used, what determines the pickup policy?

6. For outbound shipments, list the building addresses you received the most shipments from for delivery out of the Garment Center.

7. For outbound shipments, list the addresses or locations of the three apparel or transport firms that you make the most deliveries to.

8. For outbound shipments, how were the goods unloaded from your truck?

- ☐ Manually transferred from your truck to a handcart
- ☐ Loaded handcart pushed from truck that remained loaded during the shipment
- ☐ Transferred to a conveyor or other mechanical system
- ☐ Describe other

9. Describe documentation, paperwork or other means to control flow from administrative and security point of view. Determine points of "paper" transfer and count verification. Include activity involving runners, customer facility, your facility and delivery or transfer to other freight facility.

a. For outbound shipments

b. For inbound shipments

**RATES** Are your rates published? ______

Are you a member of a rate group? ______

If so, which ones? ________________________________

________________________________

________________________________

________________________________

If practical, please attach a rate schedule.

**SCOPE OF OPERATIONS** What percentage of your operations are limited to:

____% Garment Center

____% N.Y.C. (except Garment Center)

____% Commercial Zone

____% Tri-State Area (75 miles radius)

____% Northeast United States

____% Other ____________________ (specify)

**SERVICES PROVIDED** Do you offer the following services:

| Yes | No | |
|---|---|---|
| ☐ | ☐ | C.O.D. |
| ☐ | ☐ | Prepaid |
| ☐ | ☐ | Collect |
| ☐ | ☐ | Consolidation |
| ☐ | ☐ | Ticketing |
| ☐ | ☐ | Labeling |
| ☐ | ☐ | Packing |

Do you provide cargo insurance? ________

If so, what are its limitations?

________________________________

________________________________

________________________________

________________________________

________________________________

**OPINION** Do you have a fixed or typical daily route structure? ______

If so, what is it? (Please attach)

For the typical day's truck activity, please indicate the times for the following:

| | Inside Garment Center | Outside Garment Center |
|---|---|---|
| Travel time | ________ | ________ |
| Waiting time | ________ | ________ |
| Loading time | ________ | ________ |
| Unloading time | ________ | ________ |
| Number of stops | ________ | ________ |

What transportation improvements would you like to see in the Garment Center?

________________________________

________________________________

________________________________

________________________________

________________________________

________________________________

Other improvements

________________________________

________________________________

________________________________

________________________________

________________________________

________________________________

________________________________

# MANHATTAN GARMENT CENTER
# URBAN GOODS MOVEMENT STUDY

## Trucker Questionnaire
## Mail Form

FREIGHT SERVICE, FACILITIES,
AND OPERATIONS QUESTIONNAIRE

MANHATTAN GARMENT CENTER

URBAN GOODS MOVEMENT STUDY

Firm Name____________________
Person Responding____________
Title________________________

Address______________________
Phone________________________

Home Office
Location_____________________

TYPE OF FIRM

A. Common Carrier

B. Local Truckman

C. Contract Carrier

D. Private Carrier

E. Freight Forwarder

F. Air Freight Forwarder

G. Consolidator

H. Other______________

TYPE OF GOODS HANDLED (Rank by Volume 1, 2, or 3 only.)

A. Piece Goods ______

B. Cut Goods ______

C. Trim ______

D. Sewn Goods ______

E. Finished Goods ______

F. Shipped Goods ______------Hanging______% Packaged_____%

G. Shipping Supplies ______

H. Other Garment Traffic ______

I. Other__________ (Specify) ______

INDUSTRY SEGMENT SERVED (Rank the top three by annual $ Volume)

A. Piece Good Supplier ______

B. Trim Supplier ______

C. Ladies Dresses ______

D. Ladies Sportswear ______

E. Ladies Coats and Suits ______

F. Children's wear ______

G. Shipping Supplies Supplier ______

H. Other______________ (specify) ______

## TYPE AND NUMBER OF FACILITIES WHICH SERVICE THE GARMENT CENTER

_TYPE_ Number of Terminals________
Number of Stores__________
Number of Freight Halls____
Other_____ (Curbside or Sidewalk)

Complete the following for each Facility above. (use sheets 3a, 3b and 3c, if needed)

Address ____________________

____________________

Annual Revenue
$ 0 - 49,999____________
50 - 99,999____________
100 -299,999____________
300 -499,999____________
500 -1 Million__________
Over -1 Million__________

Number of Employees (including management and office Help)_______

If Contractual Labor What Union: Teamster_____ILGWU ___________

Average Hours per Week per Employee .................___________

Normal Operating Hours...........................___________

Number of Off-Street Doors or Loading Bays..........___________

Number of Square Feet Used in Area Facility.........___________

Annual Rental or Ownership Cost per Square Foot.....___________

-Volume-

1. Average Number of Hanging Garments Handled per day__________

   Average Number of Pacakages, Bundles etc. per day__________

______________________________________________

2. Average Number of Shipments per day.............__________

______________________________________________

3. Average Number of Pick-ups per day.............__________

   Average Number of Deliveries per day...........__________

______________________________________________

4. Average Pounds or Garments Handled per Hour....__________

---

-Facility-

Address______________________________

______________________________

Annual Revenue

$ 0- 49,999______________________

50- 99,999______________________

100-299,999______________________

300-499,999______________________

500-1 Million______________________

Over 1 Million______________________

Number of Employees (Including Management and office help) ______________

If Contractual Labor What Union:

Teamster______________ILGWU______________

Average Hours per Week per Employee

______________________________

Normal Operating Hours______________________

-Volume-

1. Average Number of Hanging Garments Handled per day_____

   Average Number of Packages, Bundles etc. per day______

______________________________________________

2. Average Number of Shipments per day.............______

______________________________________________

3. Average Number of Pickups per day...............______

   Average Number of Deliveries per day............______

______________________________________________

4. Average Pounds or Garments Handled per hour.....______

- Facility -

Address____________________

____________________

Annual Revenue

$ 0- 49,999____________________

50- 99,999____________________

100-299,999____________________

300-499,999____________________

500-1 Million____________________

Over 1 Million____________________

Number of Employees (Including Management and office help)____________________

If Contractual Labor What Union:

Teamster__________ ILGWU__________

Average Hours per Week per Employee

____________________

Normal Operating Hours____________________

- Volume -

1. Average Number of Hanging Garments Handled per day________

Average Number of Packages, Bundles etc. per day________

2. Average Number of Shipments per day............________

3. Average Number of PickUps per day..............________

Average Number of Deliveries per day...........________

4. Average Pounds or Garments Handled per hour.....________

---

-Facility-

Address____________________

__________ __________

Annual Revenue

0- 49,999____________________

50- 99,999____________________

100-299,999____________________

300-499,999____________________

500-1 Million____________________

Over 1 Million____________________

Number of Employees (Including Management and office help)____________________

If Contractual Labor What Union:

Teamster__________ ILGWU__________

Average Hours per Week per Employee

____________________

Normal Operating Hours____________________

-Volume-

1. Average Number of Hanging Garments Handled per day________

Average Number of Packages, Bundles etc. per day________

2. Average Number of Shipments per day...........________

3. Average Number of Pickups per day..............________

Average Number of Deliveries per day...........________

4. Average Pounds or Garments Handled per hour....________

VEHICLES SERVING GARMENT CENTER

| | AUTOMOBILE | VANS (2 axles, 4 tires) | INTERMEDIATE TRUCKS (2 axles, 6 tires) | HEAVY TRUCKS ( 3 or more axles) |
|---|---|---|---|---|
| NUMBER OWNED | ______ | ______ | ______ | ______ |
| LEASED | ______ | ______ | ______ | ______ |
| AVG. .AGE | ______ | ______ | ______ | ______ |
| AVG. VEHICLE MILES PER WEEK PER VEHICLE | ______ | ______ | ______ | ______ |
| AVG. FUEL CONSUMPTION PER WK./PER VEHICLE | ______ | ______ | ______ | ______ |

NIGHT PARKING LOCATIONS: ADDRESS ________________________________

TERMINAL______GARAGE________PARKING LOT________STREET________OTHER________________

MATERIAL HANDLING EQUIPMENT

TYPE

| | QUANTITY |
|---|---|
| FORK LIFTS | ______ |
| FLAT BED PLATFORM TRUCKS OR | ______ |

RACKS

______

______

______

DO YOU PALLETIZE LARGE ORDERS?__________

DO YOU OWN OR USE CONVEYORS?____________ HOW?______________________

DO YOU USE ANY MECHANICAL ASSISTANCE TO TRANSFER SHIPMENTS BETWEEN THE SIDEWALK AND TRUCK YES ☐ NO ☐

HOW?________________________________________

---

RATES

Are your rates published?____________

Are you a member of a rate group?____________

If so, which ones?____________

If practical, please attach a rate schedule.

SCOPE OF OPERATIONS

What percentage of your operations are limited to:

- ____% Garment Center
- ____% N.Y.C. (except Garment Center)
- ____% Commercial Zone
- ____% Tri-State Area (75 miles radius)
- ____% Northeast United States
- ____% Other________ (specify)

SERVICES PROVIDED

Do you offer the following services:

| YES | NO | |
|---|---|---|
| ___ | ___ | C.O.D. |
| ___ | ___ | Prepaid |
| ___ | ___ | Collect |
| ___ | ___ | Consolidation |
| ___ | ___ | Ticketing |
| ___ | ___ | Labeling |
| ___ | ___ | Packing |

Do you provide cargo insurance?____________

If so, what are its limitations?

______________________________________________

______________________________________________

______________________________________________

______________________________________________

How frequently do you serve the garment center?

____________________________________________

Do you have a fixed daily route structure?______
If so, what is it? (Please attach)

Has the recent energy crisis affected your operation?
Yes _____ No _____. If yes, explain.

______________________________________________

______________________________________________

______________________________________________

OPINION

What transportation improvements would you like to see in the Garment Center?

Other improvements

# IX BIBLIOGRAPHY

## IX.1 PREVIOUS GARMENT CENTER STUDIES

### IX.1.1 Trucking and Commodity Activity in the Garment Center by Coverdale and Colpitts, 1973.

In this draft report written for the West Side Highway Study, the authors analyze truck activity on Manhattan's West Side. The purpose of this study is to evaluate the impact of a new West Side Highway on the economy of the area. After presenting a precis of the 1969 Tri-State Trucking Study (described elsewhere) the report discusses 1971 truck river crossing data provided by the Port Authority of New York and New Jersey. The data depict eastbound truck traffic crossing Hudson River toll facilities whose initial destinations are west of Seventh Avenue between 34th and 42nd Streets. Almost 90 percent of the average weekday truck traffic with trip termini on the West Side between 34th and 42nd Streets go through the Lincoln Tunnel. One-third of all these trucks enter New York City via the Lincoln Tunnel during the 7-10 A.M. time period, at an average rate of approximately 100 vehicles per hour.[1]

The study then tabulates the results of a survey conducted by Coverdale and Colpitts of truckers operating between 34th and 42nd Streets. Seventy-seven percent of those interviewed are motor freight carriers while another 10 percent are consolidators. Over sixty percent of the commodities handled were finished goods. The study noted that over one-quarter of the truckers sampled handled goods exclusively within Manhattan. Ten percent of the truckers sampled dealt entirely in over-the-road trucking while 38 percent were involved with just pick-ups and deliveries. An average firm has between 30 and 35 employees.

---

[1] The average weekday total of trucks and trailers using the Lincoln Tunnel during the 7-10 A.M. period in 1971 was about 2,100 vehicles.

Although parking facilities appear insufficient, a majority of the trucking firms surveyed did not plan to expand or relocate; fifty percent opposed the idea of a consolidation terminal.

### IX.1.2 Employment and Space in the Garment District by D.F. Shaughnessy and Associates, Inc. 1972

This report sponsored by the Manhattan Office of the Borough President provides an analysis of the apparel industry's employment within the Garment Center of New York City for the 1960's. In addition, it compares the District's apparel employment picture with that of the Region (the Standard Consolidated Area) and the rest of Manhattan.

Most of the results presented are as expected. Apparel employment within the Garment District is concentrated in the women's outerwear, children's outerwear, and fur goods sectors of the industry. The size of a typical garment firm located in Manhattan's Garment District is smaller than its counterpart in the rest of Manhattan. Thirty-nine percent of the establishments located in the Garment Center have less than seven employees; while only 35% of the firms located in the rest of Manhattan employ less than seven workers. Of interest is the finding that although the area as a whole experienced a decline in employment, the Garment Center, the heart of the apparel industry, did not suffer correspondingly. The author attribute this to the constant influx of new firms into the Garment District. No such phenomenon was discerned in the remainder of the region.

The report also analyzed the quantity and price of space within the Garment District. Loft space showed a decline of half a million square feet during the 1963-1969 period; largely as a result of demolitions. During the same time period, approximately 4 million square feet of office space were constructed. The report estimated that about 30% of the total floor space existing in the Garment Center consists of office buildings.

The prognosis of the authors is that the building of office structures will accelerate within the Garment area. Whereas in the past most office buildings were erected on the periphery of the Center, new office construction will encroach and replace loft structures. This will be due to two factors: a) the gradual outward movement of garment manufacturing activities and its replacement by garment offices and showrooms and b) the cost situation. A new office structure can yield approximately three times the rental per square foot that a typical loft building commands.

### IX.1.3 Interim Report on Apparel Study, Prepared by the Department of City Planning, January 1971

This study reports statistics on employment, weekly earnings and the Garment Center's role in the City's and the nation's economy. It also documents the recent growth of imports, which rose 36 percent in 1969 and another 19 percent during the first eight months of 1970. Long-term proposals recommended for further study are:

- Consolidation of existing contractors in Brooklyn, Queens, and the Bronx.
- Provision of space in outlying boroughs for expanding Manhattan firms.
- Development of a showroom facility between West 34th and 40th Streets.
- Development of a centralized distribution facility in Manhattan or in the outlying boroughs.

It also notes that solutions to the rising pilferage and hijacking problems depend on energetic investigation of hijackers and greater union cooperation in controlling theft by employees. The report recommends looking into proposals for a New York State theft and cargo insurance pool.

### IX.1.4 Truck Freight in the Garment District by Robert A. Leighton of Tri-State Transportation Commission December, 1969

This study examines the traffic characteristics of trucks that frequent Manhattan's Garment Center. The survey discovered that 94 percent of all trucks in the area of the small, single unit variety; 46 percent are 2-axle 4-wheel vehicles. Almost all the trucks originate within the Tri-State Region, with 54 percent of them based in Manhattan. Trucks serving the Garment Center also deliver outside the area so that only 20 percent of all trucks trips have the District as a destination. A typical Manhattan truck makes about three stops per day within the Garment District.

The average weight of a Garment Center consignment is 533 pounds with 642 pounds being the average weight of an inbound shipment. On a typical day an average of 4,736 tons enter the District and 2,559 tons leave. Textiles and apparel products account for approximately 3,000 tons of all inbound freight which represents 63 percent of the total, and 864 tons or 34 percent of all outbound freight. Single unit trucks average 25 minutes per stop in the Garment Center while tractor semi-trailers average 64 minutes. The corresponding figures for all Manhattan are 20 minutes and 92 minutes. That tractor-trailers take less time to unload in the Garment Center may simply be a statistical fluke. Only seven vehicles of that category were observed.

### IX.1.5 Interim Report, by the Mayor's Traffic Study Panel, May 1968

The achievements of the Morse Task Force were summarized in this report:

- Agreement by Consolidated Edison and New York Telephone to perform street work during evening hours. Sanitation Department and private refuse collection was restricted to evening hours.

- Declaration by the U.S. Post Office to remove its trucks from Garment Center streets.
- Agreements with food, laundry, uniform and towel delivery firms to complete deliveries and leave the garment center by 11:00 a.m.
- Adjustments in bus routes, as a result of coordinated study with the Transit Authority.

The report said the greatest single cause of long truck-waiting time is inadequate elevators, and that no improvements will be accomplished without complete renewal or refurbishing of freight elevators. To reduce pilferage, the report recommended improving communications between trucker and manufacturer and truck terminal with a mechanized ramp system. The Otis Elevator Company prepared detailed preliminary recommendations for increasing elevator speed and efficiency. These would result in a system with the most modern controls, many features of which would be designed especially for the garment center.

The Task Force rejected the possibility of night-time deliveries because they would aggravate the security problem and would add to labor and building operations costs. It also found a general lack of enthusiasm for an arcading project which was not part of a total approach for the garment center.

### IX.1.6 Study of Garment Center Traffic, by the N.Y.C. Police Department, 1967

This study determined the number of parking spaces in the Garment Center, the number of vehicles and length of parking time for each vehicle.

The 10-day survey found that 23,445 vehicles spent an average of 1.4 hours at the curb and that three-fourths spent not more than 1 hour at the curb. The study notes that congestion is caused by trucks who remain in one space and deliver by hand carts to points several blocks away.

The study recommended combining the existing four-hour parking regulations with new one-hour regulations and incorporating them both into an alternate-side-of-the-street regulation.

### IX.1.6 Highway Improvement by Arcading Sidewalks: by Leonard S. Wegman Co., for the Department of Highways, November 1966

The Wegman study analyzed the construction of arcades, or public sidewalks, through the ground floors of existing buildings, to free space for traffic movement on garment center side streets.

The report focused on West 37th Street between Eighth and Ninth Avenues. It recommended that an 18-foot arcaded sidewalk be built through the more substantial buildings on both sides of the street, and that tenements and narrow corner buildings be demolished. Arcading would permit widening the street from 36 feet to 56 feet. Construction was to take place over an 18-month period in three phases: (1) work inside existing buildings to be undertaken by owners, (2) construction of the arcade by City contractors and (3) street widening.

Arcading, the report said, would minimize disruption of existing patterns, protect people and merchandise, help in reducing air pollution and, by demolishing smaller obsolete buildings, provide buildable sites. Disadvantages cited include the burdens placed on ground-level businesses which would have to cede space and the problem of relocating tenants of the buildings to be torn down.

### IX.1.8 Planning The Garment District Area in New York by Thomas Thomas, 1963

This master's thesis at Columbia University presents another suggested solution for alleviating the Garment District's problem. After describing the historical and geographical forces that contributed to the formation of New York's apparel center on the West side of Manhattan, the author analyzes some of the previously proposed solutions.

Some authorities have urged that new production facilities be built in Manhattan so that the potential exodus of garment manufacturers would be stemmed. The author claims that the construction of new buildings would not induce firms to remain in the area because of the concomitant rise in rental rates in these new buildings. However, should the demand for New York produced garments increased relative to other areas, a reversal of present trends, the rise in profits could permit rent levels to increase without inducing any additional exodus from the area. The movement of garments via trucks constitutes the main problem of the area according to the author. The proposed arcading of those blocks exhibiting a great shortage of curb space is viewed by Mr. Thomas as offering only a partial solution to the goods movement problem. The arcading scheme does not solve the inefficiencies of intra-building and vehicle to building handling of goods.

In the final section of this thesis the author outlines his proposal for the reduction of congestion in the Garment District. He suggests that a Fashion Center which will accommodate the buying and displaying elements of the apparel industry be located on Eighth Avenues between 36th and 37th Streets.

At this site easy access to the Lincoln Tunnel, the West Side Drive and a proposed crosstown expressway would be provided. Thus the strong elements of the industry, its design and marketing phases, would be nurtured and could provide the basis for future growth.

To ease the vehicular congestion problem, Mr. Thomas proposes the creation of a truck terminal to be located west of Ninth Avenue between 35th and 39th Streets, where access to the Region's arterial highways is facile. Construction of storage facilities and the free movement of trucks in and out of the facility at all hours should be encouraged. Thus an even flow of goods from the terminal to various buildings could be assured while inter-city truck activity could remain peaked. Vehicular congestion and pedestrian conflicts would be lessened because of the reduction in the number of vehicles on the street. The goods would be moved in and out of this terminal via a high speed conveyor system that would run down the middle of each block two stories above the ground floor (to avoid vehicular interference).

To avoid congestion and queuing at the elevators, the author proposes that a central receiving room be established in each building. The building handler would ship the product directly to the manufacturer, or if the elevators are being fully utilized, store the item until the elevators are free. The implementation of these suggestions would enable the apparel industry to reduce peaks of activity (congestion) without incurring any slow down in production activity. Demand for street space by vehicles and handcarts would be shifted to less congested time periods.

In addition to proposals for improving goods movement, the author offers suggestion for improving people movement and for increasing residential land use in the area.

### IX.1.9 A Study of Trucking Problems in the Garment District, by Edwards and Kelcey, for the Department of Traffic, February 1961

This study found that 45 minutes of each hour a truck is at the curb is time lost waiting for elevators and cited inadequate elevators in old loft buildings as the most significant cause of traffic congestion.

Edwards and Kelcey evaluated the feasibility of two public off-street truck berthing and platform handling facilities:

Site A, West 36th-37th Streets between Seventh and Eighth Avenues, and Site B, West 36th-37th Streets between Eighth and Ninth Avenues. The study analyzed the operations of the trucking industry and evaluated Sites A and B in terms of potential users, tonnages, trucking and handling methods, timing and construction and operating costs.

Results showed that an off-street facility with eight truck berths at Site A would be physically and economically feasible, beneficial to piece goods carriers and would help ease congestion. Edwards and Kelcey recommended that the City look for truckers interested in using Site A, proceed with design and construction and arrange for efficient operation. Site B was found to be an appropriate location for a similar facility, but development should be delayed until sufficient operating experiences has been gained at Site A.

### IX.1.10 The New York Garment Center, by Morris Zeitlin, 1961

This master's thesis in city planning at Pratt Institute presents a review and analysis of the many facets of doing business in New York City's Garment Center. Though completed for an urban planning degree, the report is really a marketing study of the Garment Center. A discussion of production trends, of the seasonal pattern of production, an analysis of the labor force and land rents, as well as a historical description of the apparel industry's development are included in the report. In addition, past suggested proposals aimed at improving the environment and the handling of goods in the area are evaluated. The proposals discussed range from mere appeals for greater cooperation among the various elements of the area to vast urban-renewal type strategies calling for the total reconstruction of the area and installation of new equipment such as moving sidewalks. At the end of the thesis, Mr. Zeitlin presents his own proposals for solving the problems of the Garment Center. He urges that a quasigovernmental corporation, dubbed The Garment Center Authority, with powers to tackle the totality of the area's problems be established. The Authority would have the power to control land-use in the area; it could condemn, purchase, and lease land and structures.

To solve the congestion problem, Mr. Zeitlin suggests locating a consolidation area on Tenth Avenue, creating an auto-free zone, and using mini-trucks to pick-up and deliver goods within the Garment Center area. No attempts at estimating the costs of the various programs or evaluating their feasibility were attempted.

### IX.1.11 A Stitch in Time, by the Mayor's Committee for World Fashion Center, February, 1957

The report offered a solution to the problems of maintaining New York City as #1 in the garment industry. Main concerns in 1957 were employment loss (down to 300,000 from 347,000 in 1948) and loss of business to Florida, Texas and California.

The Mayor's Committee recommended that the City and the industry cooperate in building a 40-story fashion tower and related facilities such as retail stores, restaurants and a first-run theater. The report recommended that the tower include space for showrooms, sales and administrative offices and fashion publications and that smaller buildings have extensive loading facilities and manufacturing space. Total rental space was 4.3 million square feet, or about 20 percent of projected 1970 needs.

The site was a triangle immediately south of the intersection of Broadway and Avenue of the Americas and astride the proposed 30th Street crosstown expressway.

The Mayor's Committee recommended a study be made of the extent of City and garment industry participation in making the World Fashion Center a reality.

The Mayor's Committee was a group of 46 garment industry, retail, real estate and finance executives.

### IX.1.12 Garment Industry Study, by Larry Smith & Co., for the Mayor's Interdepartmental Traffic Council, June 1957

The Smith study, a preliminary analysis of industry operations, reported manufacturing activities declining, marketing service and distribution activities increasing and traffic volume remaining constant. Preliminary evidence also showed a weakening of the garment labor pool, with skilled workers aging and potential new entries opting for competitive fields.

The report gave first priority to City programs aimed at putting existing facilities to better use and suggested deferring development of new facilities until a comprehensive plan for the district was formulated.

Because of the paucity of data on the industry, the study recommended two research efforts, one on materials handling and a second on traffic patterns. These were to include evaluation of the possibilities of truck staging facilities, a central "post office" warehouse, off-street parking and loading facilities, replacement of loft buildings and a fashion center and clearing house for the needle trades. The report noted there was not enough data available to support the World Fashion Center proposal. The study recommended formation of three groups:

- A Mayor's Citizen Committee for the Garment District, including industry and City representatives to make policy and coordinate joint programs.
- An Interdepartmental Committee for the Garment District to formulate City policy.
- A Garment District Planning Task Force, with staff representatives from the agencies in the Interdepartmental Committee, to carry out the Committee's comprehensive planning policies.

### IX.1.13 Made in New York: Case Studies in Metropolitan Manufacturing, Edited by Max Hall, 1959

The women's and children's apparel industry was examined by Roy Helfgott in this study of manufacturing in the New York Metropolitan Region. After presenting a general picture of the apparel industry in the United States, the author analyzes the historical and economic factors that have contributed to the concentration of women's apparel manufacturing within New York. The image of clothing manufacturing in the Garment Center that emerges is one of an amalgam of small shops concentrated in a compact area using little capital and employing a few highly skilled workers to produce a seasonal and fashion-oriented (changeable) product. Yet these small shops are responsible for approximately 65 percent of all the money spent on women's apparel purchases in the United States.

Mr. Helfgott also describes the economic forces acting to reduce Region's dominance in the apparel industry. The two principal factors responsible for this outward movement are shifts in demand away from formal stylized clothing and changes in relative costs of production such as reductions in the cost of labor in areas outside of New York Region and increases in transportation costs.

After summarizing the agglomerative and deagglomerative forces that shaped New York's Garment Center. Mr. Helfgott peers into his cloudy crystal ball and attempts to predict the future of New York's apparel industry. Based on past trends, the author argues that the merchandising sector, that is, the showroom, sales, and office functions of the apparel industry will show an upward trend in the Region. Similarly the production of higher-priced, fashion-oriented garments will increase. The production of standardized, cheaper apparel products will continue to decline within the New York Region.

IX.1.14 Freight and the Metropolis by Benjamin Chinitz, 1959

This is a Harvard University Study that examined the economic structure of the New York Metropolitan Region. This volume explores the effect of existing transportation facilities have on the locational decisions of firms. Many industries locate within the New York Region despite the high wage rates prevalent in the area. Mr. Chinitz argues that the great diversity of transportation modes, their greater availability, the greater volumes of freight carried, and the lower rates charged enable New York based firms to be somewhat more competitive with firms from other areas who have lower labor and land costs. A special advantage of locating in New York is the ability of small firms to consolidate their shipments into carloads and truckload lots and therefore get a lower rate per shipment. In addition, the author examines the effects that transportation and rate changes will have on the locational preferences of firms. For example, the construction of a new highway will open previously inaccesible areas and probably reduce travel time between two cities. This new route can induce firms to relocate to the area where inputs, particularly labor, are cheaper, usually this means that firms move out of the New York Metropolitan area. On the other hand, if the industry deals with an non-standardized product it must remain within the New York Region and therefore the construction of a new roadway expands the market area served and implies that an increase in employment will follow.

In the appendix, the author presents data on the flow of goods in and out of the region obtained by a survey.

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